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PLAN FOR DEVELOPMENT OF THE LAND AND WATER RESOURCES OF THE SOU--ETC(U)
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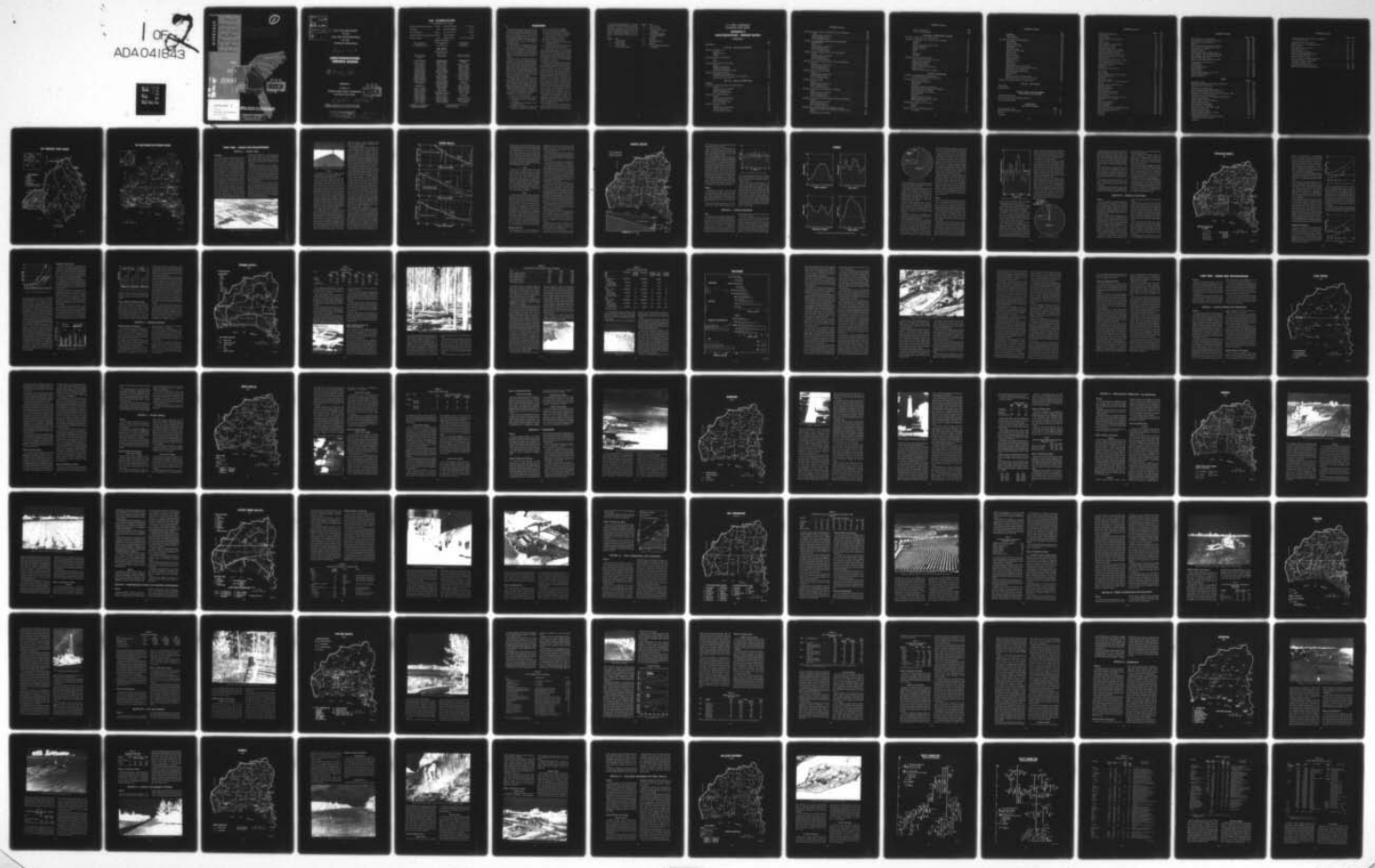

Plan for Development of the Land and Water Resources of the Southeast River Basins

1

CHOCTAWHATCHEE
PERDIDO BASINS

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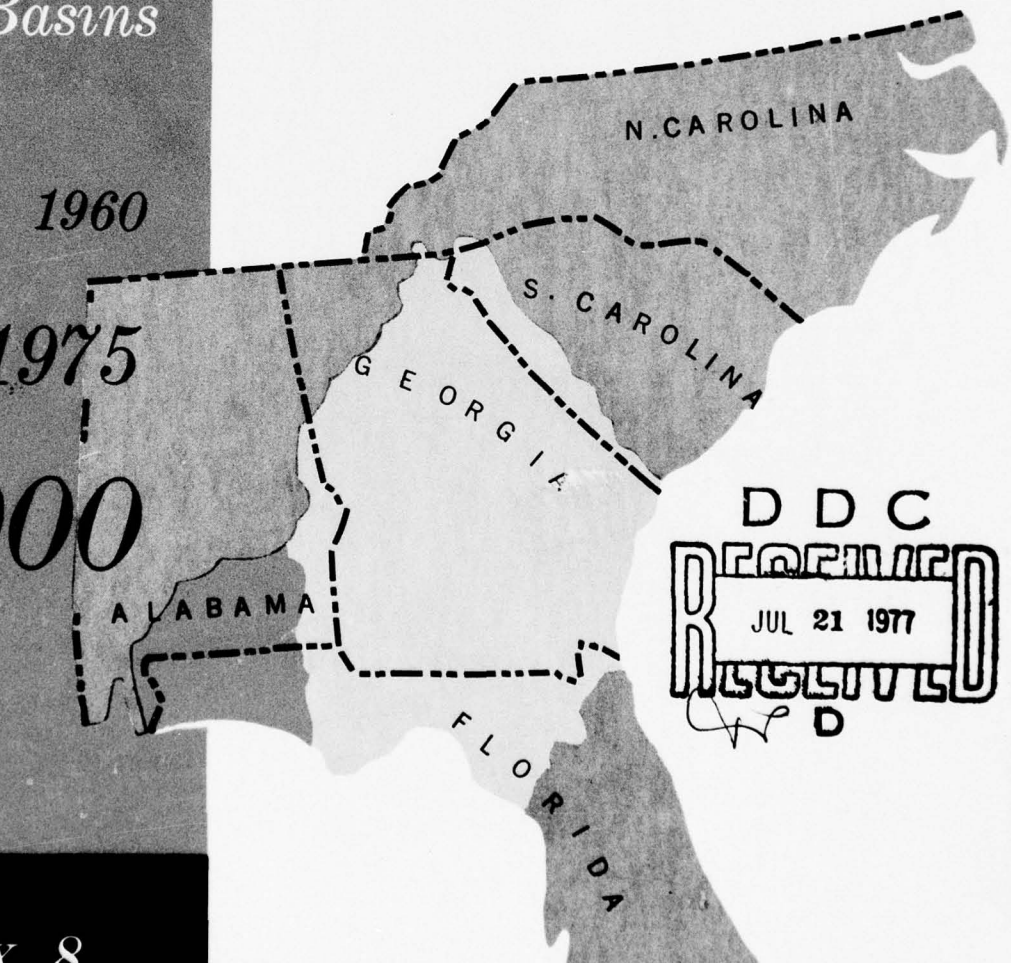

APPENDIX 8

To report of...

United States Study Commission

Southeast River Basins

1963

(6)

PLAN FOR DEVELOPMENT OF THE LAND AND WATER RESOURCES OF THE SOUTHEAST RIVER BASINS.

Appendix 8.

CHOCTAWHATCHEE-PERDIDO BASINS.

(9) Final rept.

APPENDIX 8

TO REPORT OF

UNITED STATES STUDY COMMISSION

SOUTHEAST RIVER BASINS

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FOREWORD

This Appendix summarizes the results of studies made in formulating a comprehensive plan for the conservation, utilization, and development of the land and water resources of the Choctawhatchee-Perdido basins. The plan for the Choctawhatchee-Perdido basins is a part of the comprehensive plan for the development of the land and water resources of the Southeast River Basins.

Data relevant to the development of the land and water resources of the Choctawhatchee-Perdido basins are summarized in six interrelated parts. The matter contained in each part is pertinent to the comprehensive plan. The reader is urged to consider the Report in the aggregate rather than to consider selected material out of context.

Part One includes a description of the area, a discussion of its resources, and presentation of the present and future population and economy. Part Two presents the level of needs by purpose. Part Three describes planning procedures as applied to this study. Part Four presents the comprehensive plan, including improvements requiring early action for the Choctawhatchee-Perdido basins. Part Five contains the conclusions; and Part Six acknowledges the assistance of public and private agencies and individuals.

The Report of the United States Study Commission summarizing the plan for the Southeast River Basins is made in response to the provisions of Public Law 85-850 (72 Stat. 1090) dated August 28, 1958, which established the United States Study Commission, Southeast River Basins. Public Law 85-850 is reproduced in Appendix 13.

The authorizing Act provides for an integrated and cooperative investigation to formulate a comprehensive and coordinated plan for:

(1) Flood control and prevention;
(2) domestic and municipal water supplies;
(3) the improvement and safeguarding of navigation;
(4) the reclamation and irrigation of land, including drainage;
(5) possibilities of hydroelectric power and industrial development and utilization;
(6) soil conservation and utilization;
(7) forest conservation and utilization;
(8) preservation, protection, and enhancement of fish and wildlife resources;
(9) the development of recreation;
(10) salinity and sediment control;
(11) pollution abatement and the protection of public health; and
(12) other beneficial and useful purposes not specifically enumerated in the Act.

The comprehensive plan for the Southeast River Basins is formulated to meet the projected needs of the area for land and water resources development to the year 2000. Projects and programs existing and under construction in 1960 are included in the plan, but only 1960-2000 developments are analyzed.

The plan for the development of the resources of the Southeast River Basins and the Choctawhatchee-Perdido basins is the result of cooperative work of Federal, State, local and private agencies having interest in the area and knowledge of its needs and requirements. Public hearings were held early in the planning process to obtain firsthand knowledge of conditions and problems in the study area and to secure suggestions for their solution. Throughout the study, liaison was maintained with interested groups and agencies by means of conferences and committee and advisory group meetings. When a tentative plan was developed, public presentations were made by the Commission to inform interested persons and organizations and to request comments. These comments were considered in preparing the final plan and Report.

Although many individuals, groups, and agencies have participated in the studies, the Commission takes full responsibility for the plan and for the projections, assumptions, and analyses on which it is based.

The Commission plan for the Southeast River Basins is supported by data contained in 13 appendixes. Data on the plan for development

of resources in the eight geographic areas studied in the Southeast River Basins are contained in Appendixes 1 through 8. Technical data and information applicable to both the entire study area and the several geographic areas are contained in Appendixes 9 through 13. The appendixes to the Commission Report are as follows:

Appendix	Title
1	Savannah Basin
2	Ogeechee Basin
3	Altamaha Basin
4	Satilla-St. Marys Basins
5	Suwannee Basin
6	Ochlockonee Basin
7	Apalachicola-Chattahoochee-Flint Basins
8	CHOCTAWHATCHEE-PERDIDO BASINS
9	Economics
10	Hydrology
11	Engineering and Cost
12	Planning
13	History and Organization of the Commission

U. S. STUDY COMMISSION
SOUTHEAST RIVER BASINS

APPENDIX 8
CHOCTAWHATCHEE – PERDIDO BASINS

CONTENTS

CONTENTS—Continued

CONTENTS—Continued

PART FIVE – CONCLUSIONS

PART SIX – LOCAL, STATE, AND FEDERAL PARTICIPATION AND ASSISTANCE

ILLUSTRATIONS
(some titles are abridged)

• Photograph

CONTENTS—Continued

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TABLES

* Photograph

CONTENTS—Continued

THE SOUTHEAST RIVER BASINS

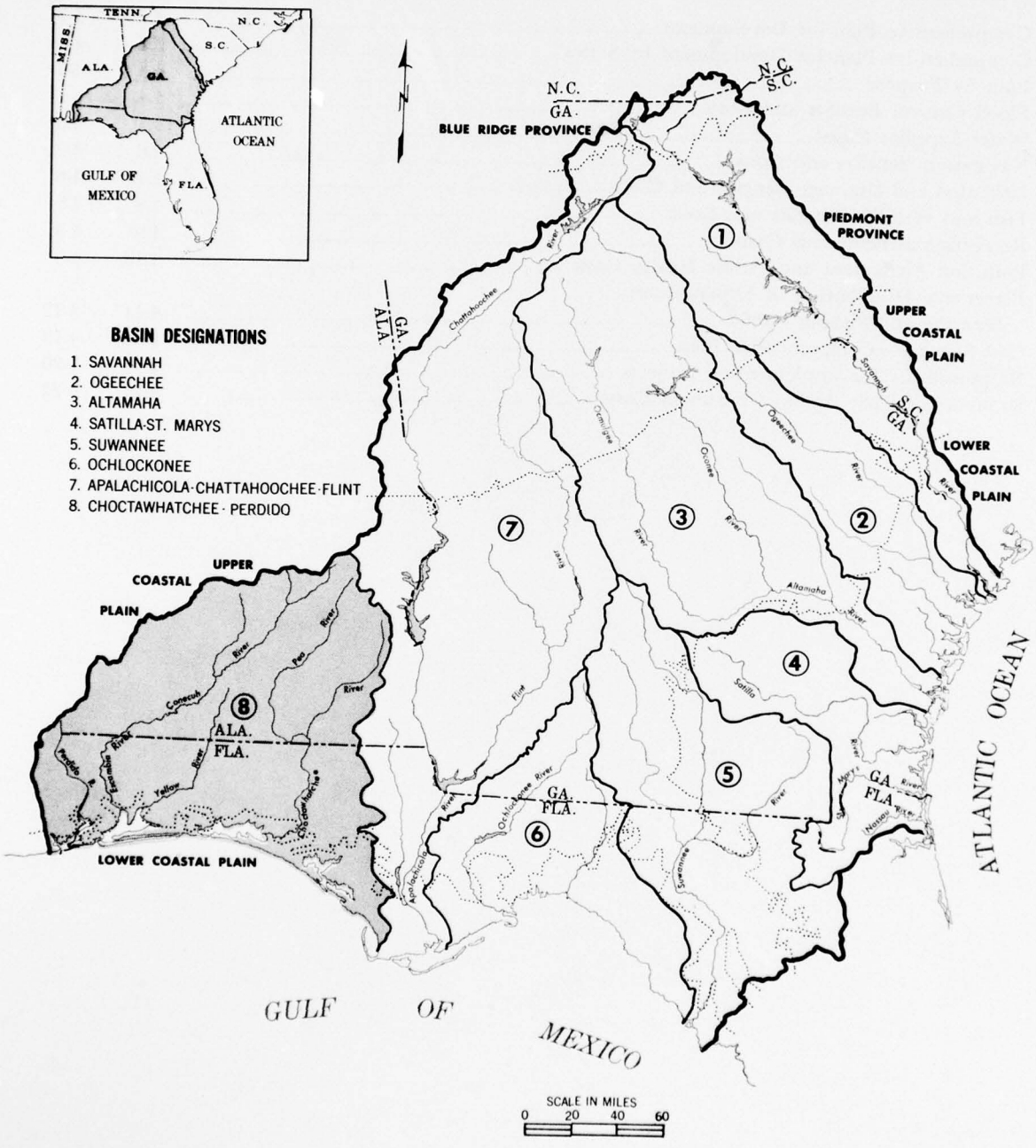


Figure 1.1

THE CHOCTAWHATCHEE-PERDIDO BASINS

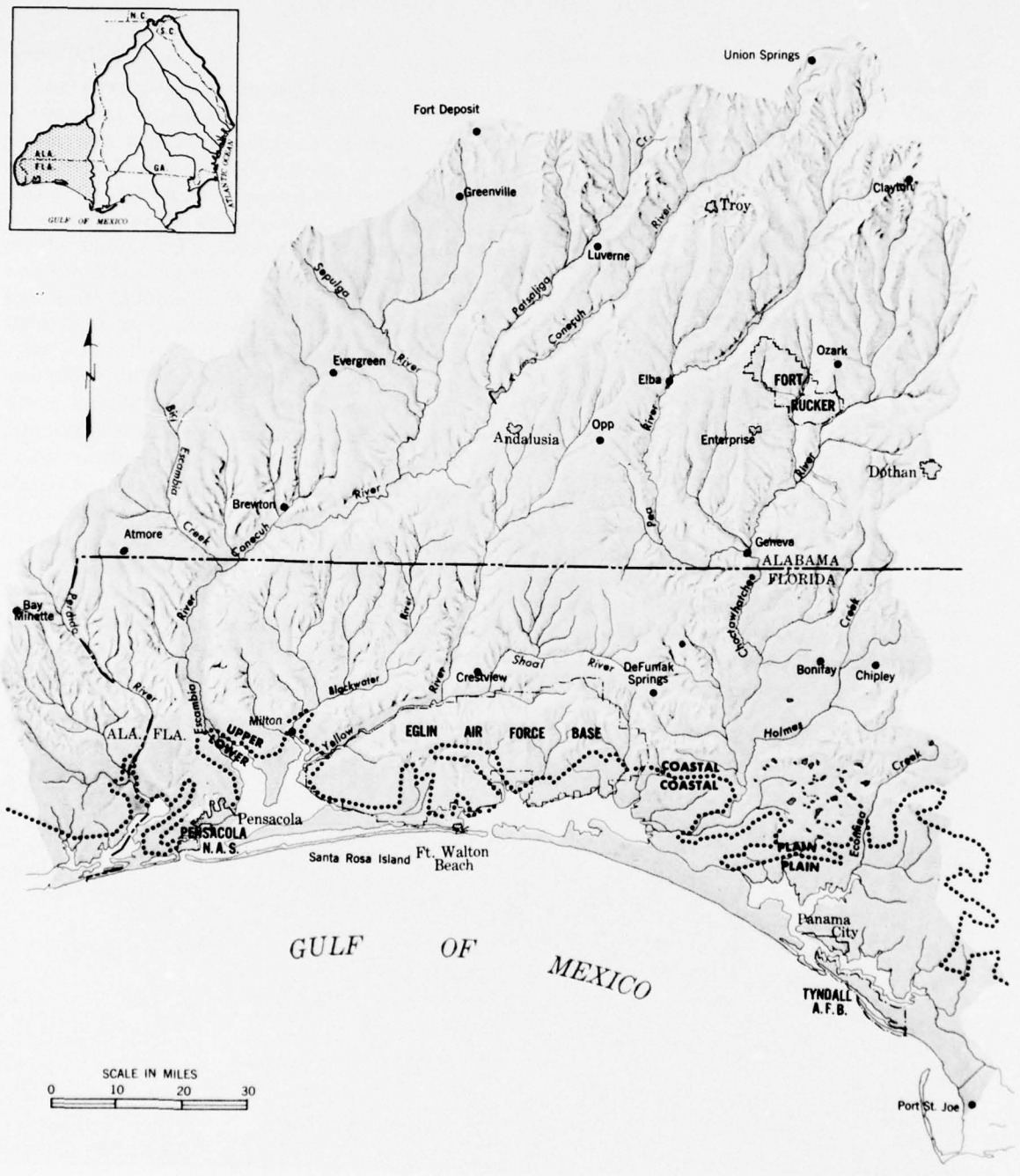


Figure 1.2

PART ONE – STAGE FOR DEVELOPMENT

SECTION I – BASINS AREA

Description

The Choctawhatchee-Perdido basins are the westernmost segment of the Southeast River Basins area and lie in southeast Alabama and northwest Florida entirely within the Coastal Plain. The basins are bounded by the Alabama River basin on the west, by the Gulf of Mexico on the south, and by the Apalachicola-Chattahoochee Rivers on the east. Included in these basins, in addition to the Choctawhatchee and Perdido Rivers, are the watersheds of several other sizeable streams which discharge directly into the Gulf of Mexico or one of its arms. These include the Yellow, Blackwater, and Escambia-Conecuh Rivers and Econfina Creek. The basins northernmost part is near the town of Union Springs in the east-central part of Alabama, about 40 miles southeast of the State Capitol at Montgomery. From this northernmost point, the basins extend 130 miles southward in a gradually widening arc to form a crescent-shaped base along the coast about 150 air-miles long. The basins embrace a surface area of 14,742 square miles including 529 square miles of large water bodies, or a net land area of 14,213 square miles. The latter includes 65 square miles of small bodies of water. The Alabama portion constitutes about 60 percent of the basins and the Florida portion constitutes about 40 percent.

About 90 percent of the area of the basins is in the Upper Coastal Plain as shown on Figure 1.2. From Union Springs, at about 600 feet above sea level, the Upper Coastal Plain extends southerly some 90 miles. This area is rolling to nearly level, with well-drained sandy soils predominating. There are small, diversified farms in the hilly areas and plantations with large fields and highly mechanized systems in the areas of gentle slopes and good soils.

About 10 percent of the area of the basins is in the Lower Coastal Plain. The Lower Coastal Plain is predominantly flat, but large areas are hummocky with many low wetlands and marshes interspersed with sandy beach ridges and dunes. The streams and rivers of this area have wide flood plains which are covered with hardwoods, while the uplands generally have a vegetative cover of pine or blackjack oak.

Figure 1.3 *Pensacola, Florida, Is the Largest City in the Basins.*

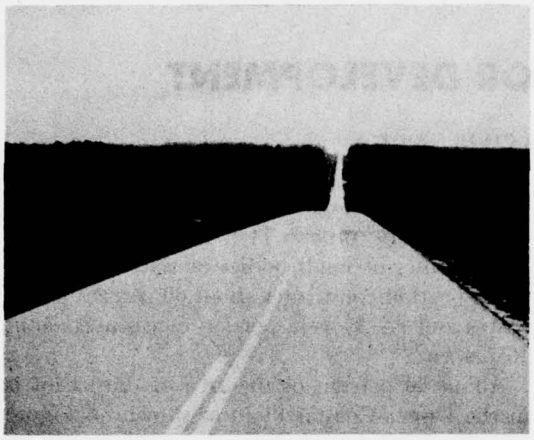


Figure 1.4 *Rolling Hills Predominate in the Basins.*

Rivers

The principal streams in the basins are the Choctawhatchee, Pea, Yellow, Blackwater, Escambia-Conecuh, and Perdido Rivers.

The Choctawhatchee River rises in Barbour County, in southeast Alabama, and flows generally southward through Alabama and northwest Florida for about 175 miles to empty into Choctawhatchee Bay, an arm of the Gulf of Mexico. The drainage basin, *which is in the* Coastal Plain province, lies between the Chattahoochee River basin on the east and the Conecuh and Yellow River basins on the west. The Pea River, the largest tributary to the Choctawhatchee River, is formed by the confluence of Spring and Little Indian Creeks in Barbour County, Alabama. It flows generally southeast to join the Choctawhatchee River near the town of Geneva, Alabama, at mile 92. Holmes Creek, the major tributary in Florida, joins the Choctawhatchee River at mile 28. The Choctawhatchee River system drains about 4,650 square miles.

The Yellow River with a drainage area of about 1,360 square miles is formed by the confluence of Hog Foot and Limestone Creeks in Covington County in south-central Alabama. It flows generally south and then southwesterly about 87 miles to its mouth in Blackwater Bay. The river is swift, shallow, and narrow in its upper reaches, and deep and sluggish between low marshy lands at its lower end. At the mouth, the mean tide range is 2 feet and the extreme tide, except during storms, 3 feet. There are a number of small streams tributary to the Yellow River, the largest of which is Shoal River that drains the northern portion of Okaloosa and Walton Counties, Florida.

The Blackwater River with a drainage area of about 860 square miles is formed by the confluence of Blackwater and Painter Creeks in eastern Escambia County, Alabama. It flows in a southwesterly direction for about 50 miles to Blackwater Bay, an arm of Pensacola Bay. The drainage basin of this slow sluggish stream lies between the watersheds of the Escambia-Conecuh River on the west and the Yellow River on the east. This stream is tidal for the lower 10 miles, having a mean tidal range of 2 feet and an extreme range, except during storms, of 3 feet.

The Escambia and Conecuh Rivers, draining about 4,230 square miles, are the same stream with the portion in Alabama being known as the Conecuh River and that in Florida as the Escambia. The Conecuh rises in Bullock County, in south-central Alabama, and flows generally southwest about 170 miles to the Alabama-Florida State line. Thence as the Escambia River, it flows generally southward about 60 miles through western Florida to Escambia Bay, an arm of Pensacola Bay. The entire drainage basin, *which is in the Coastal Plain* province, lies between the Pea River and Blackwater River basins on the east and the Alabama River and Perdido Rivers basins on the west. The Escambia-Conecuh flows through relatively high, hilly terrain in the upper or northern reaches, then through rolling farmland, and finally through marshland in the lower reach. There are a number of tributaries with the largest being Patsaliga Creek, Sepulga River, and Big Escambia Creek which enter from the right descending bank at river miles 133, 102, and 52, respectively.

The Perdido River is formed by the confluence of Fletcher and Perdido Creeks in Baldwin County in southwest Alabama. It flows generally south about 60 miles to empty into Perdido Bay which is about 35 miles east of Mobile Bay. The entire drainage basin of about 930 square miles lies between the watershed of the Escambia River, Florida and that of Mobile Bay, Alabama. Throughout most of its length the river forms the boundary between Baldwin County, Alabama, and Escambia County, Florida. The watershed lies within the Coastal Plain province. In the upper reaches, the stream following a me-

STREAM PROFILES

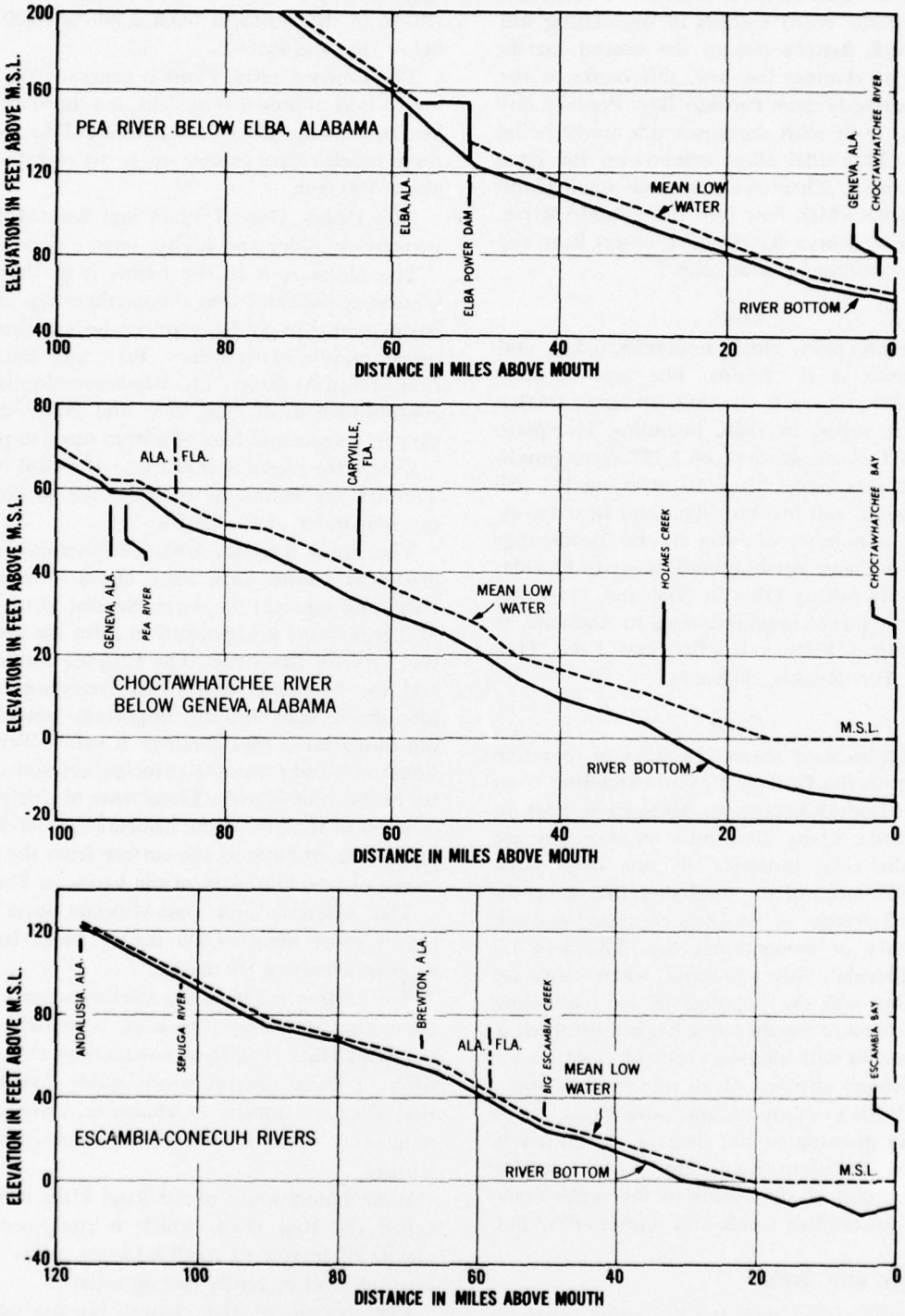


Figure 1.5

andering course through hilly terrain has a narrow channel with steep, firm banks. The terrain of the middle reach consists of undulating hill land which flattens out to the coastal marshlands. The channel has low, soft banks at the lower extremity near Perdido Bay. Perdido Bay is a tidal body with the mean tide range being 1.4 feet. This tidal effect extends up the river about 5 miles. There are numerous small tributary streams which flow into the Perdido River. The largest is Styx River which enters from the right descending bank at mile 7.

Lakes

There are many small reservoirs, lakes, and farm ponds in the basins. The area of these bodies of water, each less than 40 acres, totaled 65 square miles, in 1960, including 16 square miles of the surface area of 3,137 farm ponds. Water bodies larger than 40 acres totaled 529 square miles, and include Silver and Bear Lakes, Florida; a number of lakes in the Deadenings area of southeast Washington County in Florida; five county fishing lakes in Alabama; three hydroelectric power impoundments in Alabama, at Gantt, River Falls, and Elba; and Lake Tholocco at Fort Rucker, Alabama.

Coast

The basins have about 150 miles of shoreline fronting on the Gulf of Mexico extending from Baldwin County beaches in Alabama to Port St. Joe, Florida. Many more miles of shoreline are along the tidal estuaries of four large bays. About 350 miles of the total shoreline is beach, nearly 15 precent of which is restricted because of military or navigational use. The area includes Florida's "Miracle Strip" where cities are flourishing and the populations are expanding rapidly. Most of the shoreline has beautiful white sand beaches with shallow clean blue waters for some distance offshore. Mean tide range is about 2 feet. With so many natural advantages, resort areas are growing as the demand progressively increases. Excellent roads along the coastline from one end of the basins to the other make this an outstanding scenic and tourist attraction.

Geology and Soils

The underlying rock in the basins began as lime accumulations from marine organisms or sedimentary deposits of silt, sand, or clay. These sediments rest on a base of crystalline rock, which, in the basins, is from 2,500 to 4,000 feet below the land surface.

The Lower Coastal Plain is generally flat and sandy and represents ancient sea bottom and beaches. In the Choctawhatchee-Perdido basins, these beach ridges extend up to an elevation of about 100 feet.

The Upper Coastal Plain was formed from successively older and higher terrace deposits.

The oldest rock in the basins is of the Cretaceous age which forms the northern tip of the basins and dips under younger beds across the upper middle of Crenshaw, Pike, and Barbour Counties in Alabama. The Cretaceous formation consists of beds of sand, clay, and gravel which vary in texture and hardness from place to place.

Except for recent deposits near the Gulf coast, Tertiary age sediments underlie the surface in the remainder of the basins.

The lower Tertiary beds of limestone, clay, gravel, and sand form thick layers toward the south and taper to the north. Several formations of Tertiary age are grouped to form the area of the Tertiary limestone. The Chipola formation and the Marianna and Ocala limestones have identifiable beds and are important water-bearing formations. This complex is called Tertiary limestones and forms the principal artesian aquifer in much of Florida. Limestones of this group outcrop in the bed of the Choctawhatchee River and are at, or close to, the surface from the river to the eastern boundary of the basins in Florida.

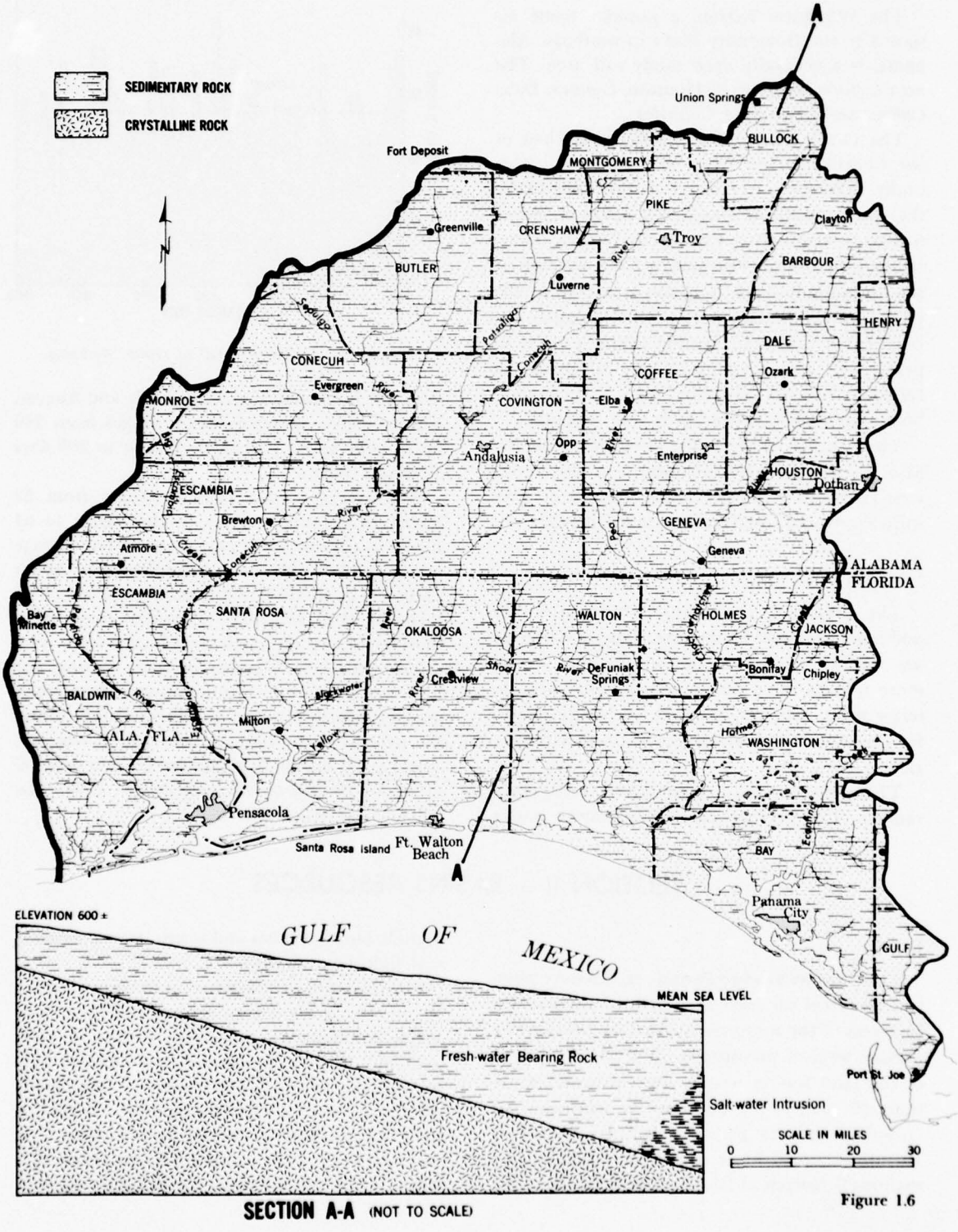
The Miocene and post-Miocene sand and gravel cover about 4,500 square miles in the southwest part of the basins.

The rolling relief in the northern portion of the basins, the Cretaceous area, is locally called the Sand Hills. The most outstanding characteristics of these grayish-brown sandy loams are that they are mixed in character, have dense sandy clay subsoils, and are very susceptible to erosion.

Immediately south of the Sand Hills is a belt called the Red Hills, which is composed primarily of brown to reddish-brown sandy loam soils on level to gently rolling relief.

Interspersed in the central portion of the basins are areas known as the Clay Hills. Slopes

GENERAL GEOLOGY



SECTION A-A (NOT TO SCALE)

Figure 1.6

of 8 to 30 percent are common and the soils are extremely susceptible to erosion.

The Wiregrass Section, a popular name assigned to the Dougherty Plain in southeast Alabama, is a generally deep sandy soil area. The area includes portions of Houston, Geneva, Dale, Coffee, and Covington Counties.

The Ocala limestone outcrops in the bed of the Choctawhatchee River and sinkhole topography developed over this limestone dominates the landscape in the Deadening Lakes region of southern Washington County in Florida. Here, topography has resulted mainly from solution of the limestone bedrock. Solution is favored by the porous sandy mantle, which retards runoff, retaining the rainwater for the slower process of percolation with accompanying solution of the limestone bedrock. No great area is without sinkholes, but their distribution is very irregular.

The Southern Pine Hills, associated with the Miocene and post-Miocene strata in the southwestern portion of the basins, consist of gray soils, sandy clay, and gravelly sandy loams.

Climate

The climate of the basins is mild in winter and hot and humid in summer. The coastal areas are slightly warmer in the winter and receive more rain in the summer and fall than the interior parts. Rainfall, however, is usually plentiful throughout the basins. Snowfall is extremely rare.

The average annual temperature is 68° Fahrenheit. The average daily temperature varies from 50° in December to 81° in July and August. The frost-free growing season ranges from 240 days in the upper part of the basins to 280 days along the coast.

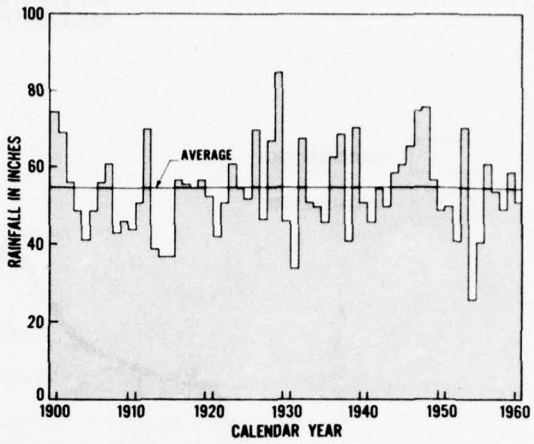


Figure 1.7 *Annual Rainfall at Ozark, Alabama.*

The average yearly rainfall ranges from 52 inches in the upper areas of the basins to 64 inches in the southwest part. Extremes of average yearly rainfall vary from a minimum of about 25 inches as in 1954 to a maximum of about 85 inches in 1929. Much of the rainfall comes from thunderstorms, although hurricanes have produced extremes. Monthly rainfall during the four wettest months, June through September, averages nearly 6 inches. Monthly rainfall during the two driest months, October and November, averages 3.5 inches. A maximum 24-hour precipitation of 20 inches was recorded at Elba, Alabama, in March 1929.

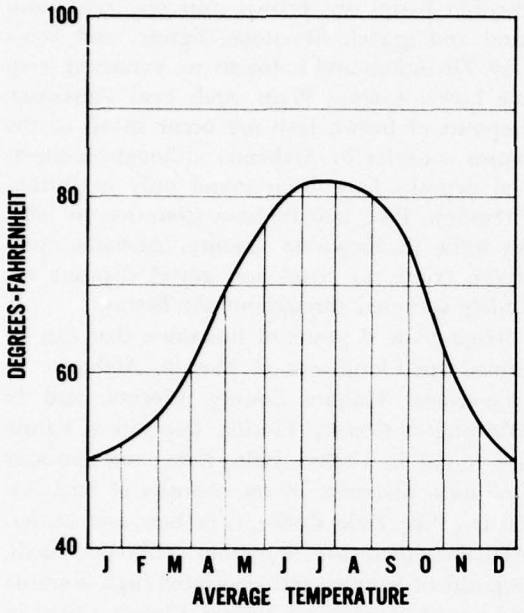
SECTION II – BASINS RESOURCES

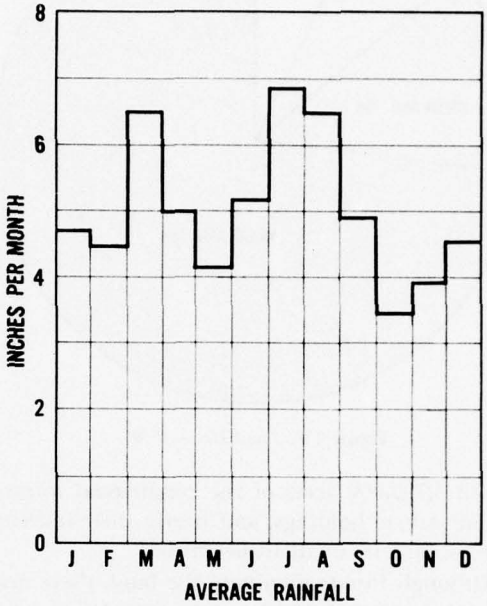
Land

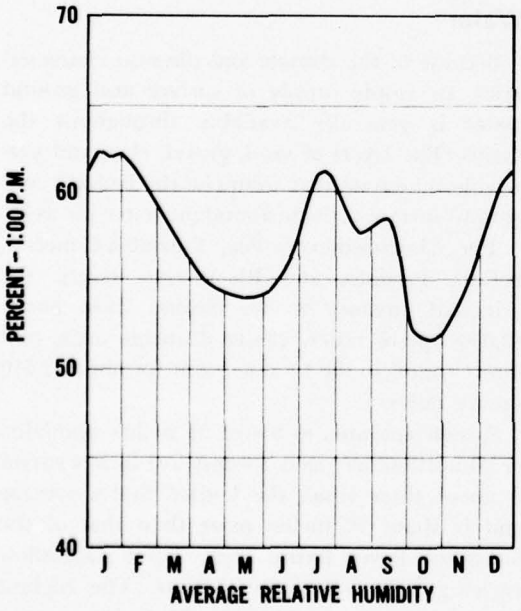
The Choctawhatchee-Perdido basins have physical resources for food and fiber production far in excess of the resources utilized in meeting the present level of production. In 1959, 73 percent of the land was in woods; and, although more than 60 percent of the land is adaptable to cropping, only 13 percent was used for crops. Pasture occupied 7 percent of the land. The remaining 7 percent of land was for other uses that include land for cities and towns, transportation, and industrial services.

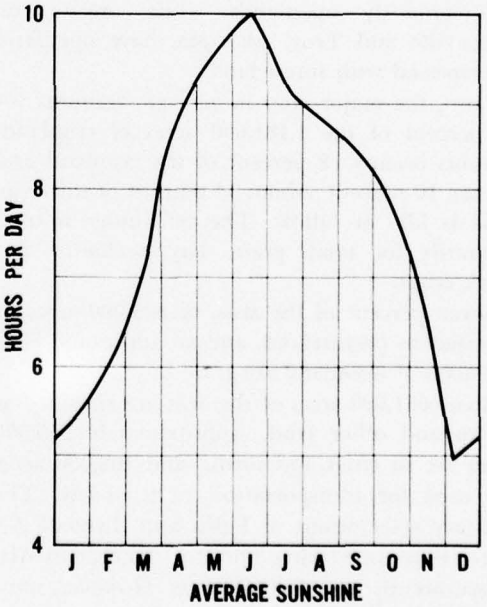
Forests occupy 6,629,000 acres of land, of which 99 percent is classed as commercial. The four major commercial forest types consist of pine, oak-pine, upland hardwoods, and bottom land hardwoods. About 834,000 acres of commercial forest land are in public ownership. Including the Conecuh National Forest, Fort Rucker, Tyndall Air Force Base, Eglin Air Force Base, 587,000 acres of this total are in Federal holdings.

CLIMATE









NOTE: Climatic data for the basins is based on recorded data for Pensacola, Florida, and Montgomery, Alabama.

Figure 1.8

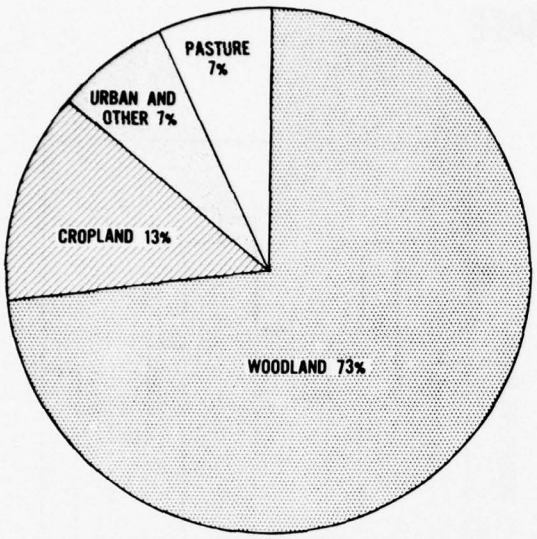


Figure 1.9 *Land Use — 1959.*

About 5,795,000 acres of the commercial forests are in private holdings, and nearly three-fourths of these are in small ownerships.

Although forests dominate the land, there are extensive areas of highly concentrated farm enterprises. The southern part of Baldwin County, Alabama, and areas around the towns of Atmore, Andalusia, Opp, and Enterprise, Alabama, are predominantly openlands while areas near Greenville and Troy, Alabama, have openland interspersed with forest land.

Corn, the major crop in acreage, accounts for 45 percent of the 1,181,000 acres of cropland. Peanuts occupy 12 percent of the cropland and cotton, 10 percent. About 14 percent of the cropland is idle or fallow. The remainder is used primarily for small grain, hay, orchards, and truck crops.

Seven percent of the area, or 625,000 acres, is classified as pastureland, and an additional 864,000 acres of woodland are grazed.

Some 661,000 acres of the area are classified as urban and other land. Approximately 245,000 acres are in cities and towns, and 162,000 acres are used for transportation rights-of-way. The military reservations of Eglin and Tyndall Air Force Bases in Florida, and Fort Rucker in Alabama, occupy over 500,000 acres. However, most of this land is also used as commercial forest land, and its major use is shown as woodland. Other lands, including farmsteads, field and access roads, swamps, and marshes occupy 125,000 acres, or about 1 percent of the total land area.

Important minerals in the Choctawhatchee-Perdido basins are brown iron ore, crude oil, sand and gravel, limestone, lignite, and brick clay. Zirconium and hafnium are extracted from the Lower Coastal Plain sands near Pensacola. Deposits of brown iron ore occur in all of the basins counties in Alabama, although commercial deposits have been found only in Butler, Crenshaw, Pike, and Barbour Counties. In 1959, 36 wells in Escambia County, Alabama, produced crude oil. Sand and gravel deposits are widely scattered throughout the basins.

High-grade deposits of limestone that can be mined are found east of Florala, Alabama, in west-central Holmes County, Florida, and in Washington County, Florida. Deposits of lignite are found in Coffee, Dale, Pike, and Barbour Counties, Alabama. In the counties of Barbour, Henry, Pike, Dale, Coffee, Crenshaw, and Butler, Alabama, there are numerous, although small, deposits of bauxite and associated high alumina clays used as refractory linings. Clays are used in brick and tile manufacturing at Brewton and Newton, Alabama.

Water

Because of the climate and physical characteristics, an ample supply of surface and ground water is generally available throughout the basins. The layers of sand, gravel, clay, and permeable limestone that comprise the bedrock and ground surface provide abundant water for wells.

The Choctawhatchee-Pea, Escambia-Conecuh, Yellow, Perdido, and Blackwater Rivers, the principal streams in the basins, drain about 12,030 square miles. Lesser drainage areas and direct runoff to the Gulf account for about 2,710 square miles.

Runoff amounts to about 25 inches annually, or 20 million acre-feet. Twenty-five inches runoff is about three times the United States average and is about 10 inches more than that of the Southeast River Basins area. Total streamflow varies greatly from year to year. The highest flow was equivalent to about 35 inches average depth over the area and occurred in 1948. In a

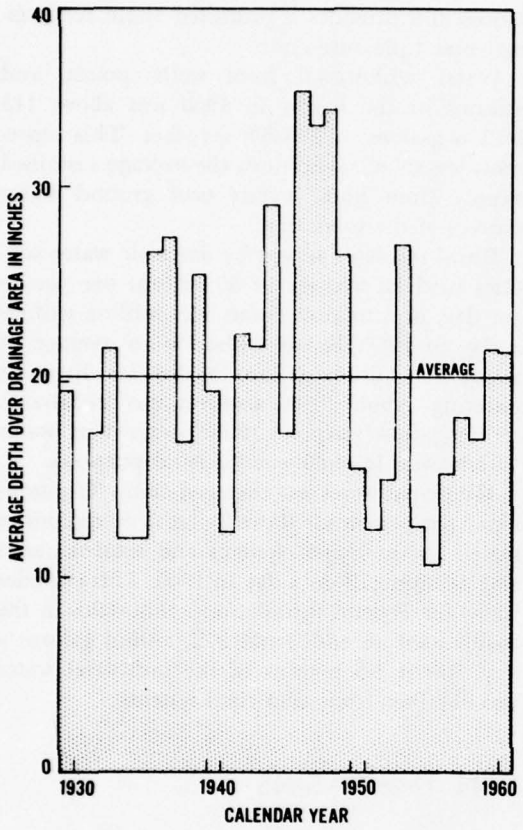


Figure 1.10 *Annual Runoff at Caryville, Florida.*

dry year, such as occurred in 1954, the runoff averaged about 12 inches over the area.

A small amount of hydroelectric power is generated at three plants in the Conecuh and Pea River systems. These regulated flows do not materially affect the quantity of streamflow.

In addition to the year-to-year variability in flow, there is great variation within a year. Streams in the basins are typically high in the winter and early spring. With the advent of summer and warm weather, the flows normally recede and remain low through autumn.

The Cretaceous sands in Alabama provide a source of water for the municipalities of Troy, Greenville, and Clayton, and for shallow-well supplies for domestic use. While adequate domestic supplies are usually available in the central part of the basins from the aquifers of Lower Tertiary age, municipal and industrial wells often require careful location to assure the desired yields. Water from the principal artesian aquifer associated with the Tertiary limestones in the southeast area of the basins is of exceptionally good quality and quantity. In the southwest part of the basins, large supplies of water are available in the sand and gravel beds of the Miocene and post-Miocene age.

The Miocene and post-Miocene age aquifer may constitute the most permeable fresh-water aquifer in North America. This aquifer of high permeability lies as a blanket of sand in an area of low relief that receives average annual precipitation of more than 60 inches and where recharge is estimated to be the equivalent of 21 inches of rainfall annually. Pensacola, the center of greatest pumpage in the area, pumped 56 million gallons a day during 1958.

The chemical quality of the ground water is good for most purposes, with a hardness ranging from 5 to 200 parts per million. It is low in dissolved solids. The only serious salinity problem appears to be near the coast. The intrusion of salty water into the aquifer near Pensacola has resulted in the abandonment of some well fields.

The natural surface waters of the basins streams are quite soft with an average hardness of about 25 parts per million and are low in total dissolved solids. This compares with average hardness of about 300 parts per million for the United States.

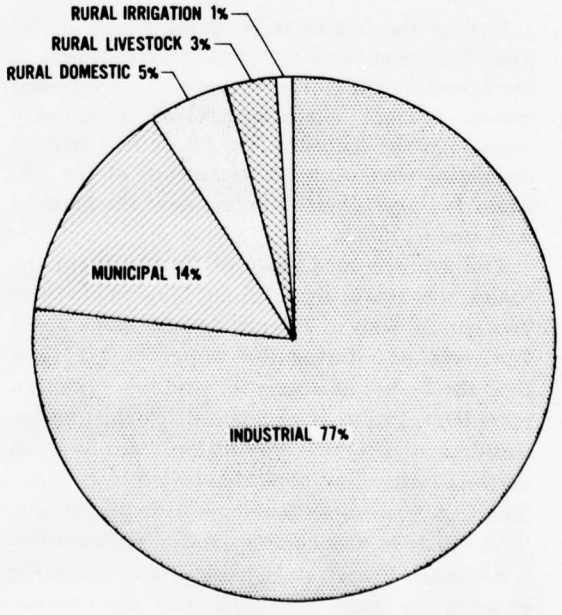


Figure 1.11 *Water Withdrawal in 1960.*

The sediment load in the rivers is not a serious problem at this time. The estimated average concentration of sediment in major streams varies from 10 to 100 parts per million. Gullied areas, such as those near Ozark, Alabama, occasionally have local concentrations considerably greater than the basins average. The greater sediment concentrations occur during the highest streamflows.

The temperature in the larger streams of the basins varies from 50° Fahrenheit in winter to 80° in summer. The smaller streams have an even greater range and a more rapid fluctuation. The ground water temperature, however, generally ranges between 65° and 70° throughout the year.

Tidal effects extend upstream about 5 to 10 miles in the major rivers. The salt-water wedge reaches nearly as far, depending on the flow of the streams.

Commercial navigation extends about 7 miles upstream from the mouth of the Escambia River. The Intracoastal Waterway spans the coast of the basins and provides a protected route for commerce and pleasure craft.

Water withdrawal from wells, ponds, and streams in the basins in 1960 was about 113 billion gallons or 350,000 acre-feet. This represents less than 2 percent of the average sustained supply from both surface and ground water sources of the total area.

Rural residents served by domestic water supplies used an average of 50 gallons per person per day, or a total of about 14.4 million gallons a day in 1960. Farms withdrew an average of about 10 million gallons a day for livestock watering. About 2,400 acre feet was withdrawn for irrigation purposes. Nine percent of water withdrawals in 1960 was for rural purposes.

Municipal water use averaged about 85 gallons a day per person for those living in communities served by municipal systems and totaled about 43.5 million gallons a day in 1960. This includes water for Federal installations. Industries in the basins used an additional 242 million gallons a day. About 1.5 percent of the industrial water was obtained from municipal systems.

SECTION III – PEOPLE IN THE BASINS

History

Most of the Indian tribes living in the basins when Europeans first appeared were members of the Lower Creek group. Tribal culture centered around villages where agriculture, principally maize, was the mainstay. In the western part of the basins were outlying settlements of the Alibamu Indians. These Alibamu gave the State of Alabama its name.

The first recorded entry of Europeans in the basins was made by Capitan Maldonado who brought De Soto to Florida. Maldonado entered Pensacola Bay during the winter of 1539 and used the harbor as a base for supplies. Nineteen years later, Philip II of Spain dispatched an expedition to colonize the region, but a storm destroyed the fleet, and the colony was abandoned. A Spanish settlement was finally reestablished in 1698 and became known as Pensacola.

Although France and Spain were endeavoring to settle the coast, the Indians of the interior, particularly in Alabama, were practically untouched by European influence until the 18th century.

England, France, and Spain were all contending for Indian trade, but the more equitable treatment by English traders soon secured Indian favor. Many of these traders married into the Creek tribes and rapidly rose to important positions in tribal life. The cessation of fur-trade wars in the middle of the 18th century induced settlers to move into the region. These settlers became prosperous in their trade with the Indians, and Pensacola flourished under English control.

The return of Florida to Spain and its subsequent acquisition by the United States precipitated a rapid change in the tempo of building and trade at Pensacola. The Indians were gradually being driven from their lands, and at the battle of Horseshoe Bend, Alabama, General Andrew Jackson broke the power of the Creek Confederacy.

A Congressional Act of 1798 created the Territory of Mississippi which included the region

POPULATION DENSITY

1960

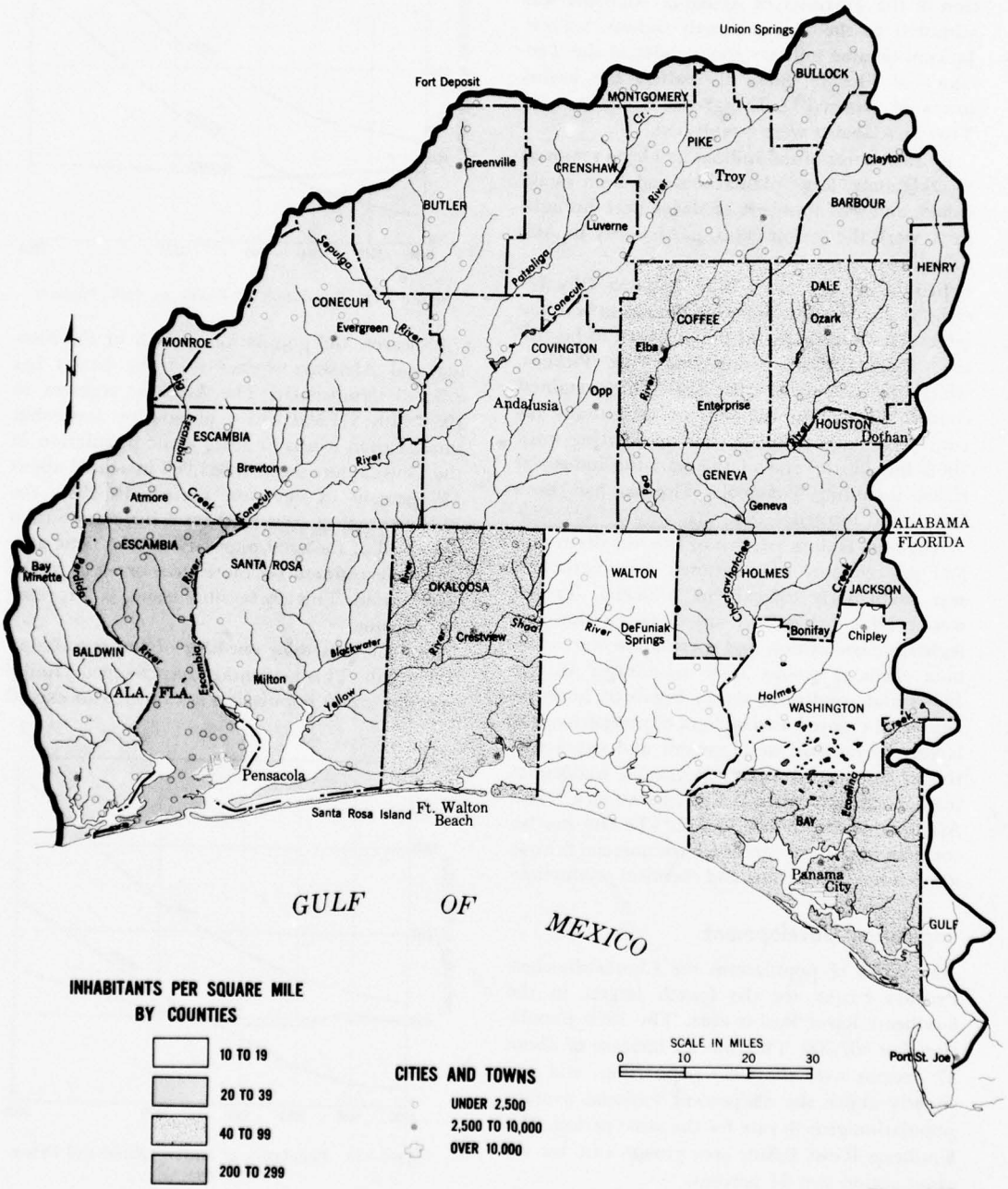


Figure 1.12

between the Chattahoochee and Mississippi Rivers. The subsequent land acquisitions along the coast from France and Spain and the cessions by the Indian nations paved the way for the creation of the Territory of Alabama. Alabama was admitted to the Union shortly before Andrew Jackson became military commander of the Territory of Florida. Soon thereafter, the basins towns of Greenville, Evergreen, Brewton, and Troy in Alabama were established.

By 1838, most of the Indians had been removed to Oklahoma, large plantations had been established, and vast numbers of slaves were brought in to work the cotton fields, particularly in Alabama.

Just before the Civil War, Panama City became a thriving seaport, and Pensacola was the largest city in Florida. At the outbreak of hostilities, Federal troops controlled Fort Pickens, which guarded Pensacola Bay. They retained control throughout the war and eventually occupied the city. Alabama saw no fighting until 1862, but by the end of the war, the industrial cities, including Pensacola, Florida, had been looted and burned.

The ante-bellum pattern of life was destroyed, and the economy was shattered. Reconstruction was particularly difficult in Alabama. Troops were available to enforce any desired action and legislative corruption and speculation were common. Federal troops were withdrawn in the 1870's and conditions slowly began to improve. Pensacola enjoyed a second era of prosperity, due largely to railroad development and exports of timber and naval stores. Pensacola underwent further stimulus when it was selected as a Naval Air Base during World War I. The city has become an important center for commercial fishing, naval-stores production, and chemical production.

Population Development

In terms of population, the Choctawhatchee-Perdido basins are the fourth largest in the Southeast River Basins area. The 1960 population was 692,500. This was an increase of about 47 percent over the 1930 population, and was slightly above the 45 percent national average population growth rate for the same period. The Southeast River Basins area growth rate for the same period was 34 percent.

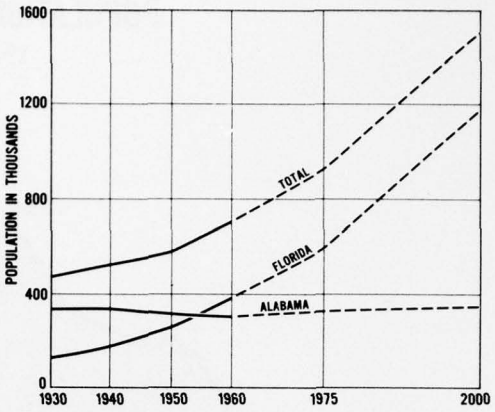


Figure 1.13 *Population of Basins by State Portions.*

However, the population growth of the Florida and Alabama segments of the basins has differed significantly. The Alabama segment in 1960 with 311,500 had a population somewhat smaller than it was in 1930, while population in the Florida portion with 381,000 increased about 177 percent in the same period. In 1930, the Florida portion accounted for a little more than one-third of the total population. The same area in 1960 accounted for more than one-half of the population. This increasing trend is expected to continue.

In 1930, less than one-fifth of the population was urban. This percentage has changed rapidly and the urban population is expected to exceed

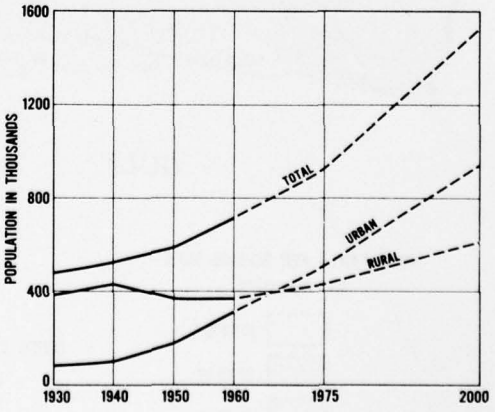


Figure 1.14 *Population of Basins — Rural and Urban Portions.*

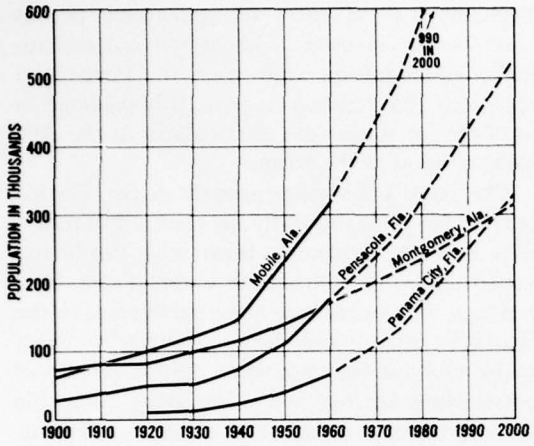


Figure 1.15 *Metropolitan Population Growth.*

the rural population in the near future. By 2000, the urban population is expected to be more than three-fifths of the total population. The urban population of the Alabama area is expected to double its 1960 population of 100,100 by the year 2000, and the urban population of the Florida area is expected to more than triple the 1960 figure of 218,600. Much of the growth is expected to be in the vicinities of Pensacola, Panama City, and Fort Walton Beach, Florida.

Under favorable land and water resources development, growth in total population is projected to reach 915,100 by 1975 and 1,518,000 by the year 2000. This projected population growth for the Choctawhatchee-Perdido basins during the period 1960 to 2000 is 119 percent as compared to 103 percent for the Southeast River Basins area. The above-average rate of growth projected for the basins is largely attributable to the exceptional growth potentials of the Pensacola and Panama City metropolitan areas in Florida and those of the important metropolitan areas of Montgomery partially within the basins, and Mobile adjacent to the basins in Alabama.

The Pensacola metropolitan area population of 173,800 in 1960 has more than tripled since 1930 and is expected to triple again by 2000. The population of Panama City metropolitan area has grown from about 12,000 in 1930 to 66,000 in 1960 and by 2000, is expected to have a population of 325,000.

Population Characteristics

Population characteristics and characteristics of the social and economic environment are interdependent. The characteristics of the present population of the Choctawhatchee-Perdido basins are a consequence of the social and economic forces of the past. The future development of the economy will be directly influenced by the characteristics of the present population.

The population of the basins historically has been predominantly rural. In 1960, 54 percent of the population still was rural. About 57 percent of the rural population is in the Alabama portion of the basins. Forty-three percent is in the Florida portion.

Of the total population of the basins, about three-fourths is white and one-fourth is nonwhite. This proportion of nonwhite is more than double the national average. In the Alabama portion of the basins, the population is about three-fifths white and two-fifths nonwhite. The proportion of population in the Florida segment of the basins is about four-fifths white and one-fifth nonwhite.

The median age of the population of the basins is about 25. This is nearly 5 years younger than the median age for the Nation. Two-fifths of the population of the basins is under 18 years of age and almost one-tenth is 65 or more. A little more than one-half of the population is between 18 and 65 years old. The age distribution of the population does not vary greatly be-

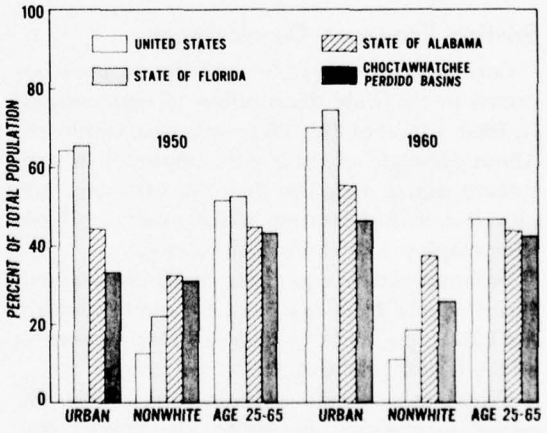


Figure 1.16 *Comparative Population Characteristics — 1950 and 1960.*

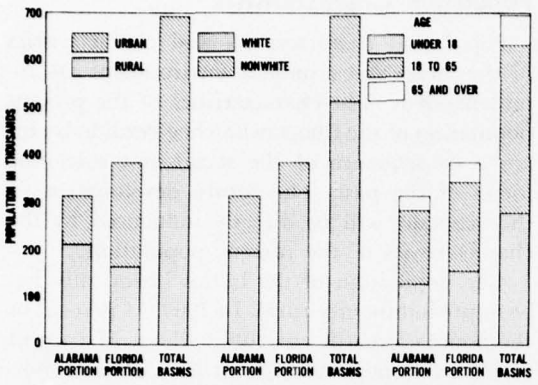


Figure 1.17 *Basins Population Characteristics — 1960.*

tween the two State portions of the basins. In the Alabama portion, the older and younger age groups are somewhat larger than in the Florida portion.

Factors Affecting Population Change

The basins encompass a relatively large geographic area in which physical characteristics and economic activities vary widely. The economic activities are widely dispersed among manufacturing activities, tourist services, military operations, and agriculture and forestry.

There has been a persistent migration from rural to urban areas as farms continue to increase in size while the number of farms decreases. Technological advances in agriculture permit fewer people to meet production requirements. Although migration away from the farm areas apparently has reached its peak, it is expected to continue for some time, particularly in the Alabama portion of the basins.

The large population growth in the Florida portion has been primarily the result of in-migration. The net increase in births over deaths has varied only slightly from the national rate. New residents and tourists are attracted because of the favorable climate and the opportunity to enjoy year-round outdoor activities. These consist of outstanding beaches and water areas along the Gulf and inland streams for boating and fishing. Many wildlife resources also are available. The influx of people also has attracted new industries interested in a good labor force and pleasant living conditions for employees. A combination of new industries and new residents has generated demand for additional housing and community facilities.

Efforts are being made in the basins to educate and train the young people for current and future employment. There is an awareness that industry requires competent managers, scientists, and highly trained workers. Population growth and the economic well-being of the area are dependent upon proper training, retention, and attraction of the human resources, as well as development of the physical resources.

SECTION IV – BASINS ECONOMY

Existing Economic Development

Current economic activity of the basins is reflected in the wide distribution of employment. In 1960, a total of 241,400 people were employed. About one-eight of these were employed in agriculture, and a little less than one-fifth were employed in manufacturing. A little over two-thirds were employed in trades and services.

Economic activity as reflected by employment varies widely from one area to another within the basins, particularly from the Florida portion of the basins to the Alabama portion.

While agricultural activities are widely dispersed throughout the basins, the heavier concentrations are in the Alabama portion of the basins where cotton, peanuts, and corn are the major crops. Over two-thirds of the total agricultural employment is in Alabama.

Gross cash receipts from farming in 1959 totaled $82 million. About $37 million came from field-crop products, mainly corn, cotton, and peanuts. Almost $44 million came from livestock products, including beef, pork, dairy, and poultry products. Net cash farm income was over $17 million.

There is also a large amount of forestry production in the basins. In 1959, an estimated 146 million cubic feet of wood was harvested from 6,629,000 acres in forests and had an approximate sales value of $14.6 million. This was exclusive of naval-stores leasing value which amounted to about $163,000.

ECONOMIC ACTIVITY

1960

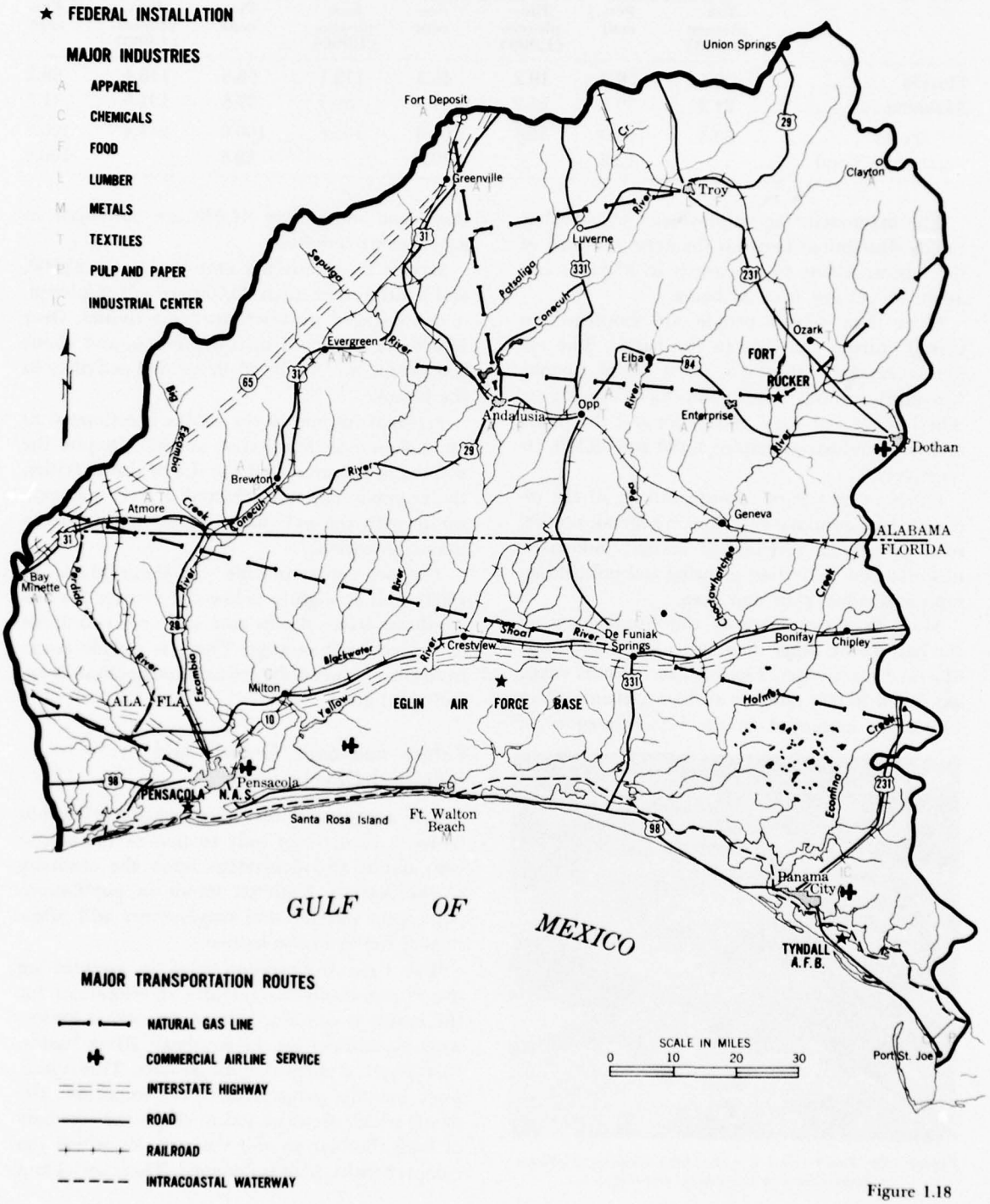


Figure 1.18

TABLE 1.1

Employment—1960

Area	Agriculture		Manufacturing		Other		Total	
	Employees (1,000)	Percent	Employees (1,000)	Percent	Employees (1,000)	Percent	Employees (1,000)	Percent
Florida	9.1	29.9	19.2	45.3	112.1	66.5	140.4	58.2
Alabama	21.3	70.1	23.2	54.7	56.5	33.5	101.0	41.8
Total	30.4	100.0	42.4	100.0	168.6	100.0	241.4	100.0
Percent of Total		12.6		17.6		69.8		100.0

The manufacturing employment is somewhat evenly distributed between the State portions of the basins. About 45 percent is in Florida, and about 55 percent is in Alabama.

More than 42,000 people are employed in manufacturing activities in the basins. The apparels category employs about 9,200 people. Chemicals are next with about 8,600 employees. The lumber and wood industries and the paper and pulp industries employ 6,100 and 5,100, respectively.

Other categories of manufacturing, in the order of their employment total, are metal; textile; food and other agricultural related industries; miscellaneous activities; printing and publishing; sand and stone, clay, and glass.

More than two-thirds of the employment in the basins is in other than agricultural and manufacturing activities. Florida has twice as many employed in this category as does Alabama. Over 47,000 are employed in the broad category of trade and more than 41,000 are employed in government activities.

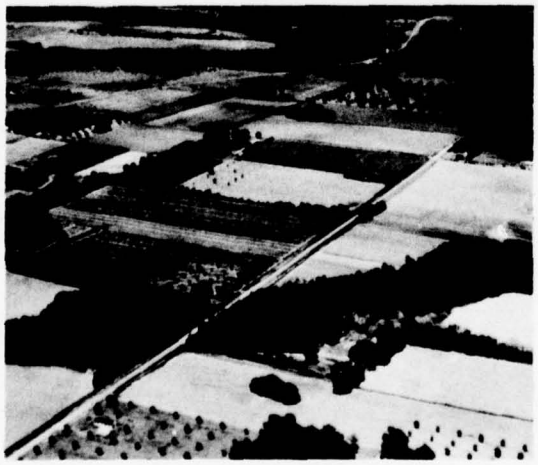


Figure 1.19 *Good Land Use, Baldwin County, Alabama, Contributes to the Basins Economy.*

Service type activities employ almost 32,000, and a little more than 32,000 are self-employed, or are engaged in miscellaneous activities. Over 15,000 are employed in construction, and about 200 people are employed in mining activities in the basins.

Personal income in the basins is estimated at more than a billion dollars in 1960. Despite the volume of resources and the size of the activities, the economy has not achieved a level commensurate with the national economy nor with the basins potentials.

The per capita income was about $1,541 in 1960. This is slightly below the average for the Southeast River Basins area and only two-thirds of the national average. There is a wide range in income between the coastal metropolitan areas and rural areas.

Future Economic Growth and Industrial Development

The economy of the Choctawhatchee-Perdido basins is related not only to that of the Southeast, but is also dependent upon the economy of the Nation. National trends in population, per capita income, and employment will affect related trends in the basins.

The basic information used in establishing the requirements for resource development for the basins is contained in an Economic Framework established for the Southeast River Basins, Part Three, Appendix 9, Economics. This framework includes projections of the important elements which are expected to shape the economy of both the Nation and the area for which the comprehensive plan is designed. These social and

Figure 1.20 *Pine Plantation 18 Years of Age, Already Thinned for Pulpwood.*

economic elements include population, gross national product, labor force and employment, income, and food and fiber requirements. The resource utilization and development needs are delineated to fit this social and economic environment and become the planning goals. The projections are not presented as precise predictions of future conditions, but are considered to be adequate as planning guides. To the extent that the projections may be too optimistic or conservative, the projected level of economic growth may be reached earlier or later, but the goals, as long-range guides, would not be greatly altered.

Projections similar to the national projections were made for the Southeast River Basins area and each of the river basins. Needs were determined in relation to these national, regional, and basins projections, physical resources, and the production requirements. Table 1.2 includes some of the more important Economic Framework figures for the Choctawhatchee-Perdido basins.

The basins population is expected to increase

TABLE 1.2

Selected Food and Fiber Production Data and Projections

Item	1960	1975	2000
Cotton (million pounds)	40.8	72.8	112.5
Corn (million bushels)	9.7	13.2	20.4
Peanuts (million pounds)	109.7	265.4	416.6
Hay (thousand tons)	37.7	159.0	243.0
Meat (million pounds)	176.4	327.8	530.5
Milk (million pounds)	220.8	391.5	682.1

to 915,100 in 1975 and to 1,518,000 by 2000. The expected rate of population growth is somewhat higher than the national average and substantially higher than the average for the Southeast River Basins area as a whole. For every five people in the basins now, there is expected to be almost eleven people by the year 2000.

With such an increase in population, and with consideration of the economic potentialities, employment is expected to increase to about 560,800 by the year 2000.

The rate of employment growth is expected to exceed the rate of population growth. This is due to both an increase in the proportion of total population in the labor force and to a fuller utilization of the labor force as the employment opportunities increase, under the assumption of optimum resources development.

Personal income is projected to increase to $6,512 million in 2000. Although the per capita income in the basins is now only about two-thirds of the national average, it is expected to be more than 90 percent of the national average by 2000. The rate of gain is expected to be above that of the Southeast River Basins area, and by 2000, the per capita income level in the basins is expected to be almost 10 percent more than the average for the Southeast River Basins area.

Employment in agriculture is expected to decline from the present level, although agricultural production is expected to continue to expand. This will result largely from continued mechanization, consolidation, and improved production technology. Farms are expected to continue to increase in size while the number of farms decrease. Agricultural employment is projected to decrease to about 23,000 by 1975 and to a little less than 18,000 by 2000.

Total farm sales are projected to increase to about $152 million by 1975 and to about $247 million by 2000. This will involve a significant increase in both crop and livestock production and is expected to raise net cash farm income to over $40 million by 1975 and to more than $70 million by 2000. Increased farm sales is expected to have a large multiplier effect on related agriculture-business industries such as fertilizers, pesticides, feeds, processing, and marketing firms.

The amount of cotton expected to be produced in 2000 nearly will triple the 40.8 million pounds produced in 1960. Peanut production is expected almost to quadruple in the next 40 years. Corn production is expected more than to double, and large increases are expected in most other field crops.

The production of livestock and livestock products is expected to increase rapidly. Beef and pork production are projected to almost double in 1975 and triple by 2000.

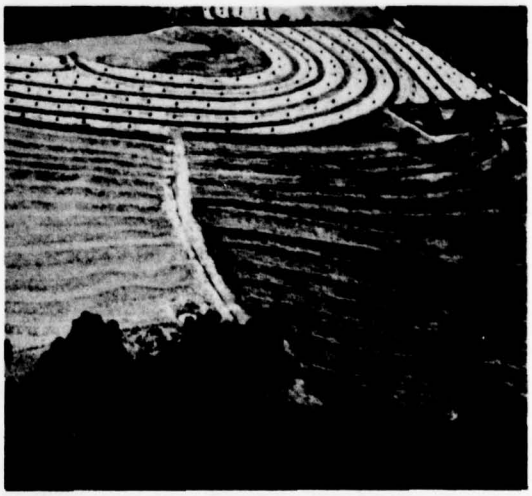


Figure 1.21 *Contour Farming Conserves Land for the Future – near Gantt, Alabama.*

TABLE 1.3

Economic Factors and Projections

Year and area	Population	Increase over 1960 (percent)	Employment	Increase over 1960 (percent)	Per capita income*	Increase over 1960 (percent)
1960						
United States	180,000,000	----	67,000,000	----	$2,222	----
Southeast River Basins	4,948,000	----	1,753,000	----	1,582	----
Choctawhatchee-Perdido basins	692,500	----	241,400	----	1,541	----
1975						
United States	235,000,000	31	89,000,000	33	3,012	36
Southeast River Basins	6,408,000	30	2,343,000	34	2,202	39
Choctawhatchee-Perdido basins	915,100	32	333,800	38	2,168	41
2000						
United States	380,000,000	111	148,000,000	121	4,733	113
Southeast River Basins	10,050,000	103	3,789,000	116	3,922	148
Choctawhatchee-Perdido basins	1,518,000	119	560,800	132	4,291	178

* 1960 dollar equivalent.

It is estimated that poultry production will more than double the present rate. Annual egg production is expected to increase from 14 million dozen in 1959 to over 43 million dozen by the year 2000.

Milk production now totals over 220 million pounds. With additional urbanization and a growing market, this production is expected to about double by 1975 and to more than triple by 2000.

Figure 1.22 *Good Pasture of Fescue Helps Meet Beef Requirements.*

These rapid production increases and the generally expanding farm production account for the projected increases in gross farm receipts and net farm income. Agriculture is expected to continue to be important to the economy of the Choctawhatchee-Perdido basins.

Total forest production is expected to continue to increase, although total woodland acreage is expected to decrease during the next 40 years as a result of an increasing demand of land for urban related uses. Despite a moderate acreage decline, improved management, advancing technology, and resource developments are expected to produce increased forest production. Total forest production is projected to increase by about 50 percent by 1975 and to more than double by 2000. A large part of this increased production probably will be pulpwood. Forestry also is expected to continue to be an important segment of the basins economy.

Forestry and agricultural activities are dis-

EMPLOYMENT

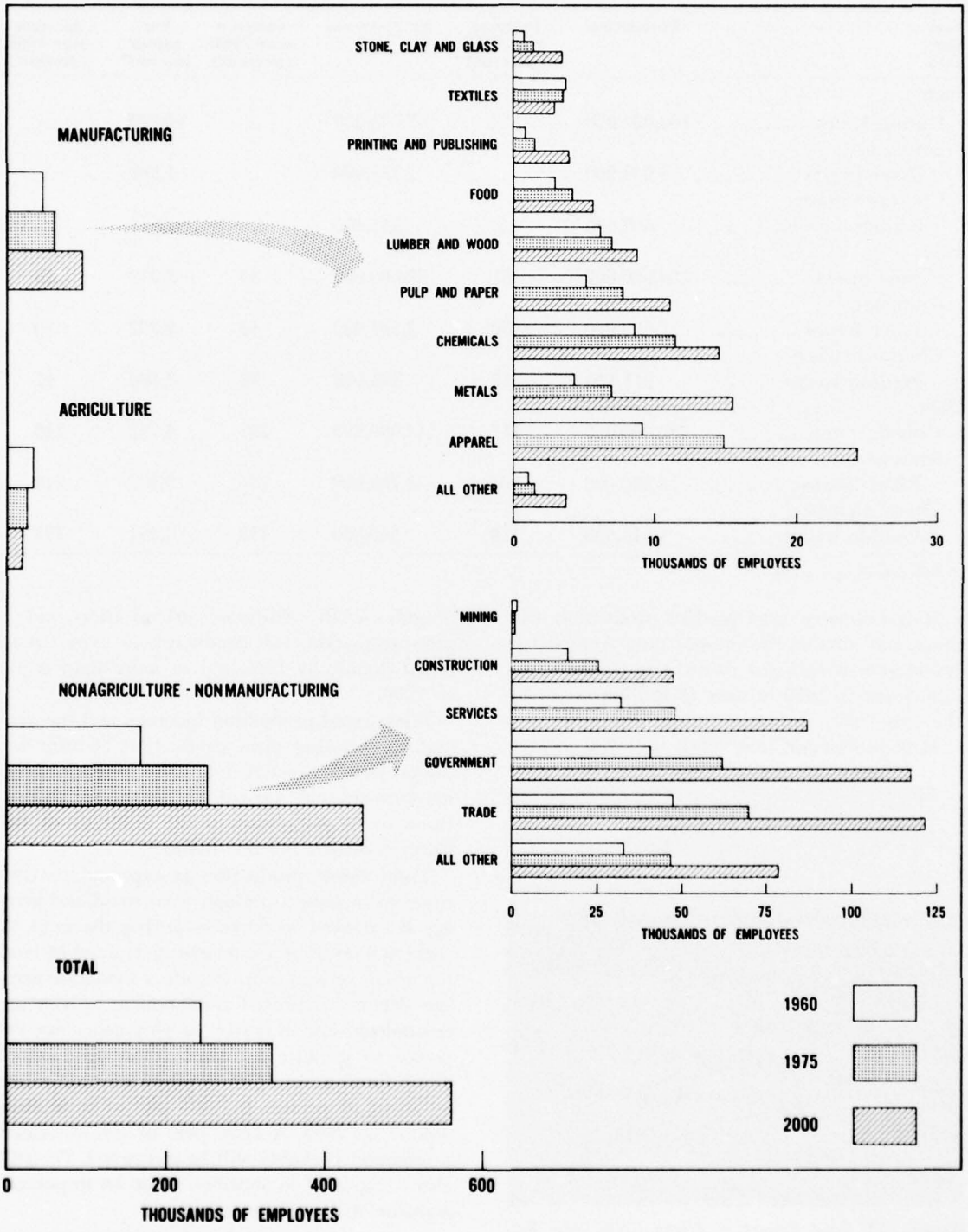


Figure 1.23

persed throughout the basins, with considerable differences in the basic characteristics shown in various areas. These differing characteristics require review in order for them to be used effectively as a guide for efficient and desirable resource development and utilization.

Farming activities, particularly row crop production, are concentrated in the Alabama portion of the basins. This is particularly true of cotton, peanuts, corn, and hay. About four-fifths of the cropland harvested in the basins in 1959 was in Alabama.

Production of livestock and livestock products is also heavily concentrated in Alabama, although production in Florida is substantial, particularly for milk, eggs, beef, and pork.

As the population grows and the demand for agricultural products including forestry increases, the land resources of the basins will need to be further developed and more fully utilized. This need is emphasized by the projections of greatly increased future production requirements.

As economic development continues, manufacturing employment is expected to increase from about 42,000 in 1960 to about 93,000 by 2000.

The future economy will be determined to a considerable degree by the nature and growth of its manufacturing industries. Because of this, factors associated with various manufacturing components were analyzed in detail.

In Alabama, Andalusia, Brewton, Enterprise, Greenville, and Troy are the major centers of industrial activity. In Florida, industrial activity is centered in and around Pensacola, Panama City, and Port St. Joe.

The largest gains in manufacturing employment are expected in the categories of apparel and metals. The apparel industries are now the largest segment of manufacturing employment. With rapidly expanding markets and a plentiful labor supply, rapid growth is expected in these industries. The apparel industries now account for over one-fifth of all manufacturing employment in the basins and for more than one-third of that in the Alabama portion.

The increase in employment for the apparel industries is based on their adaptability to rural areas and the growing popularity of the informal lines of clothing manufactured for expanding local and national markets. Employment gains are expected from expansion of existing facilities and from the installation of new plants in both rural and urban areas.

In terms of employment, the metal industries are the most important manufacturing category in the Nation and the third most important in the Southeast River Basins area. Although only about one-tenth of current manufacturing employment in the basins is in the metal industries, it is expected to continue to expand rapidly. Population growth, particularly urban, the growing market demand, and advancing technology, indicate a good potential for expansion of the metal industries.

Large employment increases are also expected in the chemical and the pulp and paper industries. In the Florida segment, more than two-fifths of all manufacturing employment is in the chemical industries, and almost one-fourth is in the pulp and paper industries.

The basins have many assets conducive to expansion and growth of the chemical industries and its allied products, even though raw materials basic to the industries are limited. The assets include exceptionally pure ground water at Pensacola although threatened by salt-water intrusion. A rapidly growing population and the abundant labor supply provide an excellent market environment. In addition, the Gulf Intracoastal Waterway and the deep-water port facilities of Pensacola, Panama City, and Port St. Joe, Florida, and the proximity of petrochemical areas along the Gulf coast are particularly advantageous. The outlook for continued expansion of current activities in this broad field appears good. New plants and facilities are expected to be added throughout the basins, but the more favorable sites are along the coast, particularly near Pensacola, Panama City, and Port St. Joe.

Possible future industrial developments include petroleum refineries using imported crude oil, direct reduction plants using local and imported iron ore, additional sulfuric acid production based on sulfur from the Gulf coast, and refractory brick plants using zirconium ores from the Florida beaches. Future potentials of the basins also appear favorable for some of the chemical formulating activities such as sanitary products, paint, cosmetics, pesticides, and sizing compounds. Activities of this type are expected to be widely distributed throughout the basins.

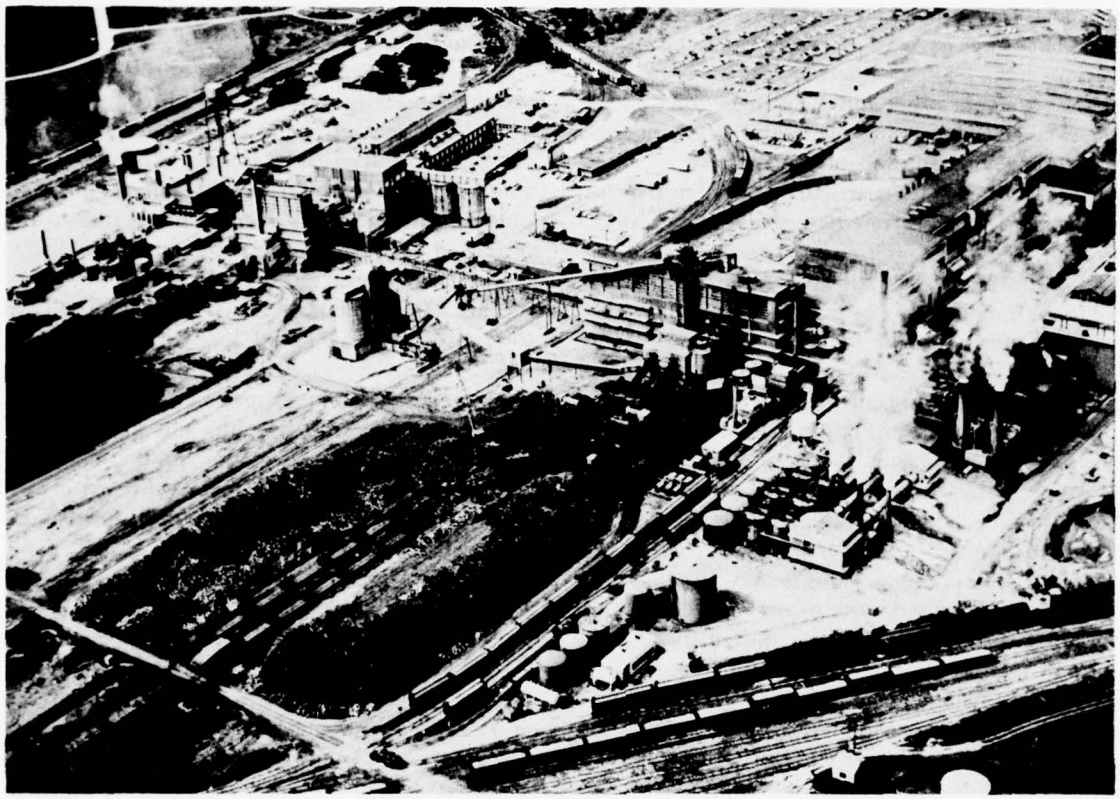


Figure 1.24 *Papermill at Pensacola, Florida, Boosts Economy of the Basins.*

Extensive forest resources and abundant water supplies in conjunction with transportation facilities and the available labor supply furnish an excellent base for expanding the basins pulp and paper industries.

Market demands for pulp and paper industries products are expected to continue to increase rapidly at local, national, and international levels. Although continued automation and other technological improvements are expected to increase productivity, employment in these industries is expected to more than double in the basins in the next 40 years. Much of this growth will probably involve expansion and existing facilities, but innovations in production, such as the new nitric acid process, may well promote wider distribution of plant facilities.

Production in the lumber and wood category is expected to rise significantly in the future, but increased mechanization and productivity will cause employment gains in these activities to be somewhat small.

Although the number employed in small, relatively rapid growth is also expected in several other manufacturing activities. These include printing and publishing; stone, clay, and glass; and the miscellaneous group.

Textiles is the only category of manufacturing activity not expected to show gains in employment. Although textile production will continue to be important with continued automation and technological improvement, the number of employees in this industry is expected to decline slowly over the next 40 years.

Over two-thirds of the people now employed in the basins are engaged in activities other than manufacturing and agriculture. With rapid population growth and significant increases in manufacturing activities, nonagricultural and nonmanufacturing activities are expected to expand rapidly.

The southern areas of the basins are favorably located to continue gaining population by in-migration. In addition to the basins natural in-

crease, people are expected to continue moving into the coastal areas. To satisfy the needs of these people, employment in trade and services should expand rapidly. As income levels rise, more income should be available for personal, business, and professional services.

Government employment including public school teachers is increasing along with other types of employment and the population. In addition, there are several large military installations in the basins. Important ones are in Coffee and Dale Counties, Alabama, and in the Pensacola, Fort Walton Beach, and Panama City, Florida areas. From a local point of view, these are expected to continue to bolster the local economy. During the next 40 years, their continued presence and such favorable factors as research facilities and expanded vocational training programs, should do much to attract new manufacturing industries in electronics and other defense-related industries.

The projected rate of population and economic growth will be accompanied by a rapid rate of expansion in construction activities. Employment in construction activities is projected to about triple in the next 40 years.

Rapid expansion is also expected in miscellaneous employment as incomes rise, market demand expands, and innovations occur.

These economic projections and the factors associated with them show a favorable outlook for the future economy of the Choctawhatchee-Perdido basins. It should be stressed, however, that these projections are made with the assumption that the land and water resources of the basins will be developed and utilized in an efficient manner. Only with continued and accelerated development of all the basins resources can the potential be realized.

The problems of generating economic growth and development in undeveloped or underdeveloped areas of our national economy are being given greater attention at all levels of government, and the people of these basins should avail themselves of every opportunity to obtain assistance to develop their economy.

The Area Redevelopment Act of 1961 is directed toward creating needed new employment opportunities through the development of facilities and resources. The program offers five broad types of assistance: Loans for industrial and commercial projects, loans and grants for public facilities, technical assistance, occupational training, and retraining subsistence payments. Many Federal and State agencies and universities cooperate under the provisions of the Act.

A forerunner of the Area Redevelopment Act was the Rural Development Program established in 1955. Now renamed the Rural Areas Development Program, this program is an interagency effort to solve some of the economic problems of rural underdeveloped areas. The U. S. Department of Agriculture and the land-grant colleges are very active in this work. Coordination in Florida is affected through the Florida Development Commission, working closely with the Extension Service at the University of Florida. Auburn University is active in this work in Alabama.

There is opportunity under the Federal Housing Act to rehabilitate residential, industrial, and commercial areas, and to obtain planning assistance for cities, small towns, and counties. Also, assistance is available through the Small Business Administration, U. S. Department of Commerce, and under provisions of the Job Training Act of 1962.

Many cities or coordinated city-county organizations have established development committees or commissions. These groups generally direct their efforts toward stimulating local interest in industrial and other developments, to defining area assets and liabilities, and to raising money for buildings and loans. The basic purpose of such groups is to attract new enterprises and increase job opportunities by raising the level of economic activity in the area. When properly organized and directed such groups are instrumental in improving the economic growth of an area or city.

In their efforts to attract new manufacturing industries, local groups may overlook the potentials for expanding existing facilities to increase employment opportunities. The plan of development presented herein is designed to provide, on a continuing basis, the type of environment wherein all the needs of a growing economy may be met. This plan alone will not generate the projected level of economic growth, but in combination with planned and coordinated action

of the local people, it will provide the pattern of resource use which will most effectively meet the needs of the people in the basins.

Social and Institutional Factors

The needs and desires of the people of any area are among the important factors involved in resource use and development. The future economy of the Choctawhatchee-Perdido basins will depend primarily upon the actions of its residents.

Public and private action in developing and utilizing the resources of the basins are significantly affected by social and institutional factors, particularly educational levels, social customs, governmental structures, and resource ownership and use patterns. These factors sometimes become obstacles. Some of these obstacles have tended to impede the basins economic development and progress.

Because of the level of economic development, the area has considerable underdeveloped and undeveloped natural resources. This results in a somewhat restricted economic base upon which to build. In the competitive race for economic development, the people in the basins must work diligently for progress and must exert increasing pressure to obtain the desired gains.

The educational level of the basins is below that of the Nation, particularly among the nonwhites which comprise a relatively large part of the population. Increased and improved educational and training facilities will be needed to provide the leadership, talent, and skills necessary for increased industrialization and economic growth. Economic activities, which now account for most economic growth, require an ample labor supply that is adequately trained and is adaptable to the modern technological skills.

The economic history of the United States demonstrates that economic growth and development proceeds most rapidly in areas where all segments of the population are adequately equipped to contribute to and participate in the total economy. Social conflict is seldom conducive to economic growth, and wide disparities in economic participation are not conducive to optimum economic production. A low-average educational level is an obstacle to both economic growth and social stability.

The nature and stability of the local government structure influence economic development. Many of these are in rural areas where population and economic activity are declining. This severely limits the revenue sources from which public services are provided. Consequently, economic stability and growth are difficult to sustain.

Many of the urban areas are growing so rapidly that the need for public services strains available revenue sources. Government structure often lacks flexibility for adapting to these transitory conditions. As a result, adequate financing of roads, schools, medical facilities, and other social service facilities are often slow and difficult. Continued progress toward more efficient and coordinated local government appears to be essential to economic growth and development.

Some institutional factors are often a cause and a consequence of the economic environment. Rapid transitions within the agricultural industry have made the labor of many small farmers, tenants, and other farmworkers marginal or surplus. Nonagricultural employment opportunities have not been adequate to absorb those leaving the agricultural industry and some outmigration from the basins has resulted. At the same time, landownership and tenancy patterns often tend to slow the rate of adjustment to more efficient and economic farming units or alternative uses. Although progress is being made in this field, continued improvement is essential.

These are only a few of the economic and social problems which the people of the basins must face and overcome in their effort to achieve further economic growth and development. Success in solving these problems is essential. The people of the Choctawhatchee-Perdido basins are beginning to recognize these problems and to deal with them effectively.

PART TWO – NEEDS AND OPPORTUNITIES

General

Existing facilities and programs, needs and opportunities, and means of meeting the needs of the Choctawhatchee-Perdido basins are discussed for each of the purposes listed in Public Law 85-850. The discussion for each purpose considers that purpose only and does not attempt to indicate or analyze its interrelationships with other purposes.

Discussion of the existing programs and facilities generally provide inventory data and briefly outline programs in which Federal and State agencies participate. Private and other public interests participate and cooperate in many of the same activities and, in addition, carry out many programs and projects not listed.

The needs and opportunities discussions point out the needs, problems, and general opportunities for meeting the needs. Specific projects and programs are not included in the discussion of means of meeting the needs. Rather, a broad outline of the types of measures that probably could be effectively used are reviewed.

Many reports on the Choctawhatchee-Perdido basins have been prepared by Federal and State agencies and by private organizations. A summary of the more important studies is included in Appendix 12, Planning.

SECTION I – FLOOD CONTROL AND PREVENTION

General

Most of the flood problems in the Choctawhatchee-Perdido basins occur in or near the Alabama portion. Several communities in Alabama and in Florida have partially extended into the flood plains. These communities are Elba, Alabama, on the Pea River; Geneva, Alabama, and Caryville, Florida, on the Choctawhatchee River; Milligan, Florida, on the Yellow River; Milton, Florida, on the Blackwater River; Brewton, Alabama, on Murder Creek; Flomaton, Alabama, on Big Escambia Creek; River Falls, Alabama, on Conecuh River; and Century, Florida, on the Escambia River. The urban development in the flood plains of these basins is extensive and flood damage has been serious.

Streamflow records including flood heights and discharges are being collected continuously at 13 river gages in the Alabama portion of the basins and at 14 gages in the Florida portion, making a total of 27 gages. The locations of these gages are not shown on Figure 2.1 but are shown on figure entitled Hydrologic Observation Stations, Choctawhatchee-Perdido Basins, in Appendix 10, Hydrology. The length of record at the several gaging stations varies from 8 to 40 years with many of the records exceeding 20 years. In addition to the river gages, there are 7 partial-record gages in Alabama and 6 in Florida where crest heights of floods are measured.

The records at these stations plus historical knowledge of some floods in the years before stream gages were in operation provide a valuable record of floods and streamflow in the Choctawhatchee-Perdido basins. From these it is possible to evaluate the flood problems as well as the water supply throughout the basins.

More than four-fifths of the floods in the basins occur during winter and early spring. Destructive floods have occurred in 1861, 1916, 1925, 1928, and 1929. The March 16-18, 1929, flood was the greatest flood of record in the Choctawhatchee-Perdido basins. The flood-producing storm ranks as one of the greatest ever experienced in the Southeastern United States. Rainfall at the center of the storm was 29.6 inches at Elba, Alabama. The time lapse between a storm and the passage of the flood peak may be as short as one-half day requiring prompt flood forecasting and warning to be effective.

Existing Facilities and Programs

The United States Weather Bureau makes flood forecasts for the Pea River at Elba, Alabama; for the Choctawhatchee River at Newton and Geneva, Alabama, and at Caryville, Florida;

FLOOD CONTROL

1960

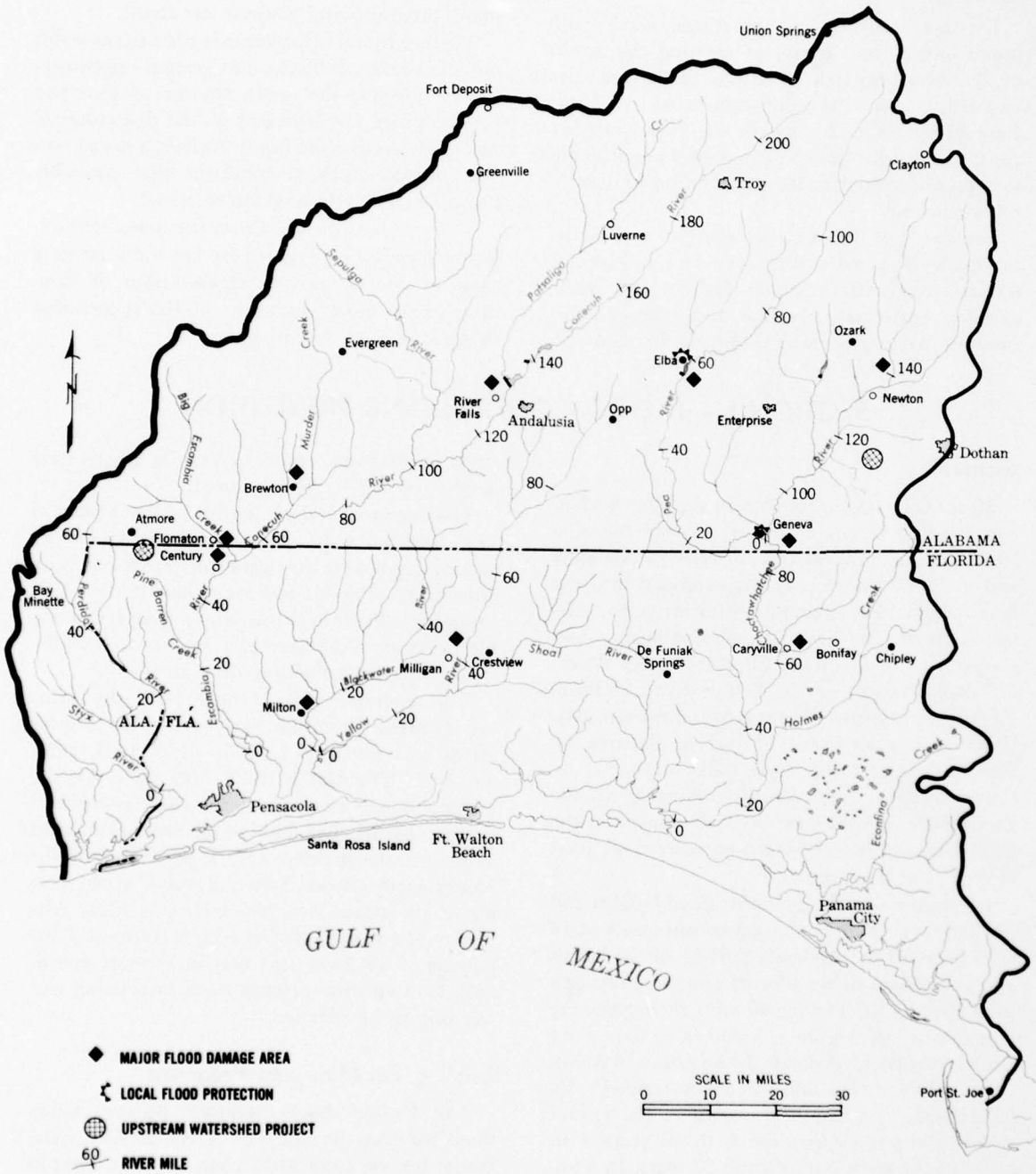


Figure 2.1

for the Yellow River at Milligan, Florida; for Big Escambia Creek at Flomaton, Alabama; for the Conecuh River at River Falls and Brewton, Alabama; and for the Escambia River at Century, Florida.

Levees have been built along the Pea River at Elba, Alabama, and the Choctawhatchee River at Geneva, Alabama. Both levees were constructed in 1938 by the Works Progress Administration to protect the towns against recurrence of a flood equal to the disastrous one of 1929.

Three applications from Florida and one application from Alabama have been received by the Soil Conservation Service for assistance under the provisions of Public Law 566, 83d Congress, the Watershed Protection and Flood Prevention Act. Watershed protection and flood prevention plans and authorization for installation have been made for the Pine Barren Creek watershed in Florida and Alabama near Flomaton and the Brackins Mill Creek watershed in Alabama near Dothan. In addition, the regular conservation programs of the U. S. Department of Agriculture contribute to the improvement of hydrologic conditions and the control of runoff and erosion in the Choctawhatchee-Perdido basins. Two drainage facilities benefiting 1,000 acres in Alabama and Florida provide some flood protection for drained lands.

Federal aid to assist urban areas with comprehensive planning and zoning is available under Section 701 of the Federal Housing Act. Section 206 of the River and Harbor Act of 1960 authorizes the Corps of Engineers to advise local governing bodies about flood hazards and the desirability of flood-zoning regulations, when such information is requested.

Needs and Opportunities

The inventory of soil and water conservation needs carried out under leadership of the U. S. Department of Agriculture indicates a need for watershed projects encompasing more than 8 million acres. Special studies conducted for the Commission show that watershed projects encompassing approximately 1.9 million acres could be developed through the year 2000 by cooperative effort, normally affected through formal organizations that have legal status under State law. The terms planning unit watersheds and watershed projects are used synonymously here.

The most serious flood problems occur in communities along the main streams of the Choctawhatchee, Pea, Escambia, and Conecuh Rivers and Big Escambia and Murder Creeks. Flood damages also occur in upstream tributaries to existing crop and pasture, public roads, farm roads, bridges, and buildings.

Flood damage has been determined for the mainstreams of the Choctawhatchee, Pea, Yellow, Blackwater, Escambia, Conecuh, and Perdido Rivers and Big Escambia Creek. Of a total average annual damage of $694,800, 30 percent of the flood damages in the basins has occurred in the Choctawhatchee-Pea drainage area, 61 percent in the Escambia-Conecuh drainage area, and 9 percent in the remaining drainage area. Agricultural damage is relatively low because of the small amount of bottom lands cleared for crops and pasture. The annual flood damage to public highways and railroads in the basins is estimated as 19 percent of the total flood damage. Annual flood damage is expected at least to double by the year 2000 unless additional flood protection is provided or unless controlled by effective flood plain management.

The levee at Elba, Alabama, has so restricted the valley cross section, it is estimated that a flood one-half the magnitude of the 1929 flood would produce a flood stage equal to the 1929 flood. Extensive development has occurred outside the levee. A recurrence of the 1929 flood would now affect 63 dwellings and 7 small businesses that are without flood protection. At Geneva, 38 dwellings would be affected by recurrence of the 1929 flood. Should a duplication of the 1929 flood occur at Caryville, Florida, where there is no protection, 63 dwellings and 20 business establishments would be affected. Recurrence of the 1929 flood in the Escambia-Conecuh basins would affect an estimated 215 residences and 140 businesses at Brewton, Alabama, on Murder Creek and 390 residences and 100 businesses at Flomaton, Alabama, on Big Escambia Creek.

Means of Meeting the Needs

Flood plain management including zoning, flood forecasting, and construction of flood-protection works can be used to protect the lives and

property of the people in the basins from flood loss.

Local zoning as a part of flood plain management appears desirable for regulating possible residential and industrial development of the flood plains. Local flood problems should be clearly noted and appropriate measures taken so that future buildings and improvements will not be located in the flood plains where a serious flood hazard exists.

The present system of flood forecasting is generally adequate but minor changes, such as telemetered gages, could improve its effectiveness. Flood forecasting provides time for the people in the flood plain to remove livestock, equipment, and furnishings, and, in case of major floods, for notifying officials of the danger to highways and railroads.

Flood protection works such as levees, channels, reservoirs, and diversion of floodwaters can be used to protect existing facilities and could also supplement flood plain development. The flood plains of these rivers are generally submarginal for crop production and are used principally for production of pulpwood, timber, and for pasturing of livestock.

Multiple-purpose flood prevention and drainage facilities can be installed on upstream watershed areas.

SECTION II – WATER SUPPLIES

General

The development and protection of safe, adequate water supplies needed for the growth of the basins is an important part of the public health program.

Ground water is abundant throughout the basins. Wells yield as much as 3 million gallons a day. Ground water is usually of uniformly good quality; however, in certain areas, particularly along the coast, dissolved solids exceed the recommended drinking water standard.

The surface waters of the basins are consistently suitable with a minimum of treatment for municipal and industrial uses; however, all but one of the municipalities and many of the industries surveyed use ground water sources for their supplies.

Existing Facilities and Programs

Domestic Water Supplies

Domestic water supplies are defined as private individual supplies mainly designed to serve a single rural family. It is estimated that in 1960 there were 63,800 rural homes with a population of 287,300 served by 60,000 domestic water supplies. An estimated 3,800 rural homes had no onsite water supply and obtained water from nearby wells.

Of the estimated 60,000 domestic supplies serving rural homes, approximately 24,500 were drilled wells ranging in depth from 16 to 500 feet; an equal number of dug wells ranged in depth from 10 to 90 feet; 3,600 bored wells were from 32 to 210 feet deep; and 5,500 driven wells had depths of 21 to 80 feet. Approximately 1,900 rural homes depended upon springs for their supplies. About 75 percent of the domestic water supplies were equipped with pressure systems. Only 38 percent of the domestic supply inventoried met the accepted sanitary standards of construction and equipment. Approximately 7 percent were reported as undependable because of a limited quantity of water, and approximately 19 percent needed treatment to improve their quality and potability.

The Farmers Home Administration program for group development of rural water supplies is available to assist in the development of water supply for groups of rural homes.

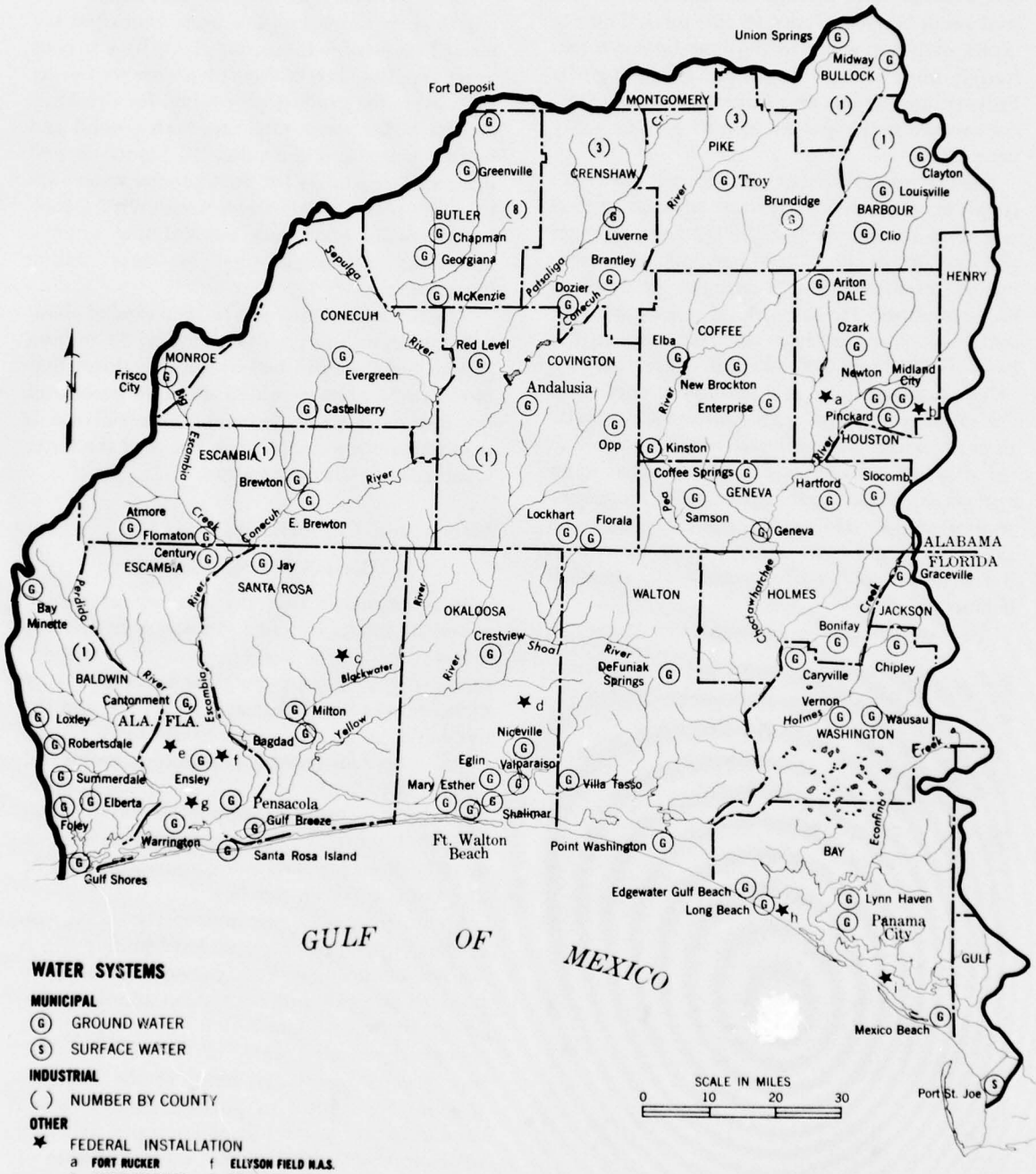
Municipal Water Supplies

Ground water is the source of all but one of the municipal water supplies. In 1960, there were 400 municipal wells ranging in depth from 30 to 1,841 feet. Only six of the wells were less than 100 feet deep and seven were more than 1,000 feet. Port St. Joe, Florida, obtains surface water from the Chipola River outside of the basins for its supply.

In 1960, municipalities, subdivisions, and nine Federal installations with an estimated popula-

WATER SUPPLIES

1960



WATER SYSTEMS

MUNICIPAL

(G) GROUND WATER

(S) SURFACE WATER

INDUSTRIAL

( ) NUMBER BY COUNTY

OTHER

★ FEDERAL INSTALLATION

a **FORT RUCKER**
b **NAPIER FIELD N.A.S.**
c **WHITING FIELD N.A.S.**
d **EGLIN A.F.B.**
e **SAUFLEY FIELD N.A.S**
f **ELLYSON FIELD N.A.S.**
g **CORRY FIELD A.F.B.**
h **NAVY MINE LAB**
i **TYNDALL A.F.B.**

Figure 2.2

tion of 405,200 were served by 110 water systems. Total daily water use by all these systems averaged 46.8 million gallons with about 7 percent used by industry. Water supplied by many privately owned wells serving municipal and industrial needs is not included in this total. The per capita daily water use in the four largest towns ranged from 69 to 126 gallons. Excluding the Federal installations and industrial water usage, the average municipal use was 85 gallons a day per person.

Florida reported that 221 motels and 423 restaurants had their own water supplies in 1960 and used an estimated 600,000 gallons of water per day. Information was unavailable concerning the number of water supplies in Alabama for semipublic facilities. It is estimated that total water use for these water supplies in the basins in 1960 averaged 1 million gallons per day.

The bacteriological and sanitary quality of all the supplies for municipal and semipublic facilities are under the surveillance of the State health departments. Sixty-seven of the municipal water systems are chlorinated routinely for added protection and bacteriological control. Eighteen supplies are aerated to remove iron or sulfur. Twenty-six supplies are treated for chemical balance.

Assistance from the Housing and Home Finance Agency is available to municipalities for development of water supplies.

Figure 2.3 *Water for Residents of Pensacola, Florida.*

Industrial Water Supplies

Some industries in or near municipal areas obtain their water supplies from municipal systems. Twenty-nine industrial plants have private water supplies. Ten of these plants use well water exclusively for product processing, for drinking, and for boiler water. One uses both ground and surface water and the other 18 plants depend upon surface sources for their process water supplies. Six plants obtain water from wells for cooling purposes. Four have recirculating systems, and four use surface water for their cooling water supply.

The industrial water use in 1960 totaled about 242 million gallons per day including 3.3 million gallons per day furnished by municipalities. Surface water sources provided about 70 percent of the industrial water demand. Industrial use is primarily nonconsumptive and most of the water is returned to streams as waste.

Needs and Opportunities

Domestic Water Supplies

It is estimated that the number of people served by domestic water supplies will decrease but the per capita water consumption will increase. By 1975, the population to be served by domestic supplies is estimated at 251,100 and the per capita usage is expected to rise to 70 gallons a day. This will require 17.6 million gallons of water a day. By the year 2000, the population to be served by domestic supplies is estimated at 226,900. Per capita usage is expected to increase to 100 gallons per day, and consumption will be 22.7 million gallons per day.

Many rural wells are improperly sealed, uncovered, without pumps, or have pumps which are not self-priming. Poor construction and improper water-handling equipment afford no protection against contamination of the supply. Although the ground water of the basins is uniformly good in quality, many of the domestic supplies are subject to possible bacteriological contamination as a result of improper well construction or handling of the water. Entrance of surface runoff after heavy rain results in turbid water in unprotected wells. Improved construc-

TABLE 2.1

Municipal Water Facility Needs

State	Year	Number of places requiring			
		Wells	Treatment	Elevated storage	Distribution systems
Alabama—					
	1960-1975	23	33	22	37
	1975-2000	19	19	17	43
Florida—					
	1960-1975	26	26	33	42
	1975-2000	45	45	48	62

tion with proper sealing is needed to afford protection to the supply. Some of the supplies were reported as containing objectionable amounts of sulfur, iron, and hardness in the water affecting its potability.

Municipal Water Supplies

Except in some coastal areas, ground water resources in the basins are adequate in quantity and quality for both existing and foreseeable future water needs. In some areas, the quality is somewhat impaired by dissolved solid content. Overdevelopment of the aquifer near the coast has created a problem of salt-water intrusion. Development of a surface water supply can be considered when the quality of the ground water is not amenable to treatment, or when development of the ground water supplies create a possible hazard of salt-water intrusion.

Several of the reporting municipalities needed improvement of their water supply systems. In addition to the needs reported in 1960, other facilities could be enlarged to insure an adequate supply to meet future development of the communities.

In determining water-facility needs, subdivisions were considered part of the metropolitan area and water systems to provide water of better quality more economically have been included to serve nonurban population concentrations in water districts. Needs for Federal installations are not included.

Prior to 1975, 59 municipalities are expected to require additional sources or treatment of water. Fifty-five are expected to need elevated storage and 79 are estimated to need to extend their distribution systems or construct new systems. Similar improvements are expected to be needed between 1975 and the year 2000 to assure adequate supplies for the future demand.

The projected needs will be met predominantly by the development of ground water resources. However, this would not preclude consideration of the use of surface water supplies in areas where the ground water is limited or where the hazard of salt-water intrusion or infiltration exists or where the water is of an undesirable quality.

Based on population projections and use trends, daily water supply requirements are expected to be 100 million gallons by 1975 and 258 million gallons by 2000. Municipal water systems are expected to serve 664,000 people in 1975 and 1,291,000 people by the year 2000. Water requirements for the year 1975 are based on an estimated average demand of 150 gallons a day per person for all urban areas. Water usage for the year 2000 is estimated at 200 gallons per capita per day.

Industrial Water Supplies

Most of the industries in the basins are expected to expand, and new industries are expected to develop. Industrial water requirements are projected to total about 386 million gallons per day by 1975 and 769 million gallons per day by the year 2000. While ground water aquifers are expected to continue to be used as sources of supply, surface water use for industrial purposes are expected to increase.

Means of Meeting the Needs

Domestic Water Supplies

Each owner could develop his own supply consistent with his financial ability, or community systems serving several rural homes could be developed through group development of rural water supplies. All wells should be properly cased, sealed, and equipped with satisfactory pumps and pressure systems. Water supplies containing objectionable amounts of sulfur, iron, or hardness could be treated to improve the quality of water.

Prior to 1975, new wells should be constructed to replace those which have inadequate sources, existing wells should be covered and sealed to afford protection against contamination, and pressure systems should be installed. After these improvements have been completed, a continuing maintenance and rehabilitation program could assure satisfactory sources of supply for the rural homes for the year 2000.

Municipal Water Supplies

Municipalities must plan and provide for their own needs. Technical assistance can and should be obtained from Federal, State, and private sources. There are no apparent unusual problems of supply, development, or treatment.

Industrial Water Supplies

The normal growth of existing industries and development of new industries will require the expansion of facilities to provide adequate water supply prior to 2000. Needed facilities will include new sources of supply, additional treatment plants, increased storage, and other water-handling equipment. With proper development of the water resources, adequate water supplies for the projected foreseeable development of the basins can be accomplished without difficulty.

SECTION III – NAVIGATION

General

Principal navigation facilities in the basins include the Gulf Intracoastal Waterway and the deep-water ports at Port St. Joe, Panama City, and Pensacola, Florida. Other navigation features include numerous barge terminals at ports adjacent to the Gulf Intracoastal Waterway and others at sites off the Waterway but served by it.

The inland rivers have not been developed for modern navigation, and only their tidewater reaches are used by commercial waterborne traffic.

Existing Facilities and Programs

The Gulf Intracoastal Waterway is an important artery of trade extending from Apalachee Bay westward through protected bays and sounds and inland cuts to the Mexican border. Its authorized minimum dimensions are 12-foot depth and 125-foot width. Feeder channels include East Pass Channel from the Gulf of Mexico to the Choctawhatchee Bay at the eastern end of Santa Rosa Island; the Gulf County Canal connecting the waterway to St. Joseph Bay just north of Port St. Joe; and La Grange Bayou, an arm of Choctawhatchee Bay extending north to Freeport, Florida. The Gulf County Canal has an authorized depth of 9 feet. East Pass Channel and La Grange Bayou each have a 12-foot authorized depth.

Studies by the Corps of Engineers are underway or are authorized on a number of Coastal channel projects. These include:

Shallow-draft channels connecting the Gulf of Mexico to Perdido Bay via Perdido Pass; from Choctawhatchee Bay at Point Washington via a land cut to the Gulf; from East Bay across Santa Rosa Peninsula and Santa Rosa Island to the Gulf; from the south arm of Mulat Bayou to Escambia Bay; and from Lynn Haven Bayou to North Bay.

Small-boat channel in Pensacola Harbor to the foot of "B" Street and Joe's Bayou; small-boat channels and basins in Bayou Texar and at Bayliss Park; a channel for small craft and barge tows from the Gulf through Phillips Inlet to Lake Powell, thence northward by land cut to the Intracoastal Waterway; and increased channel dimensions of the existing Gulf County Canal to 12-foot depth.

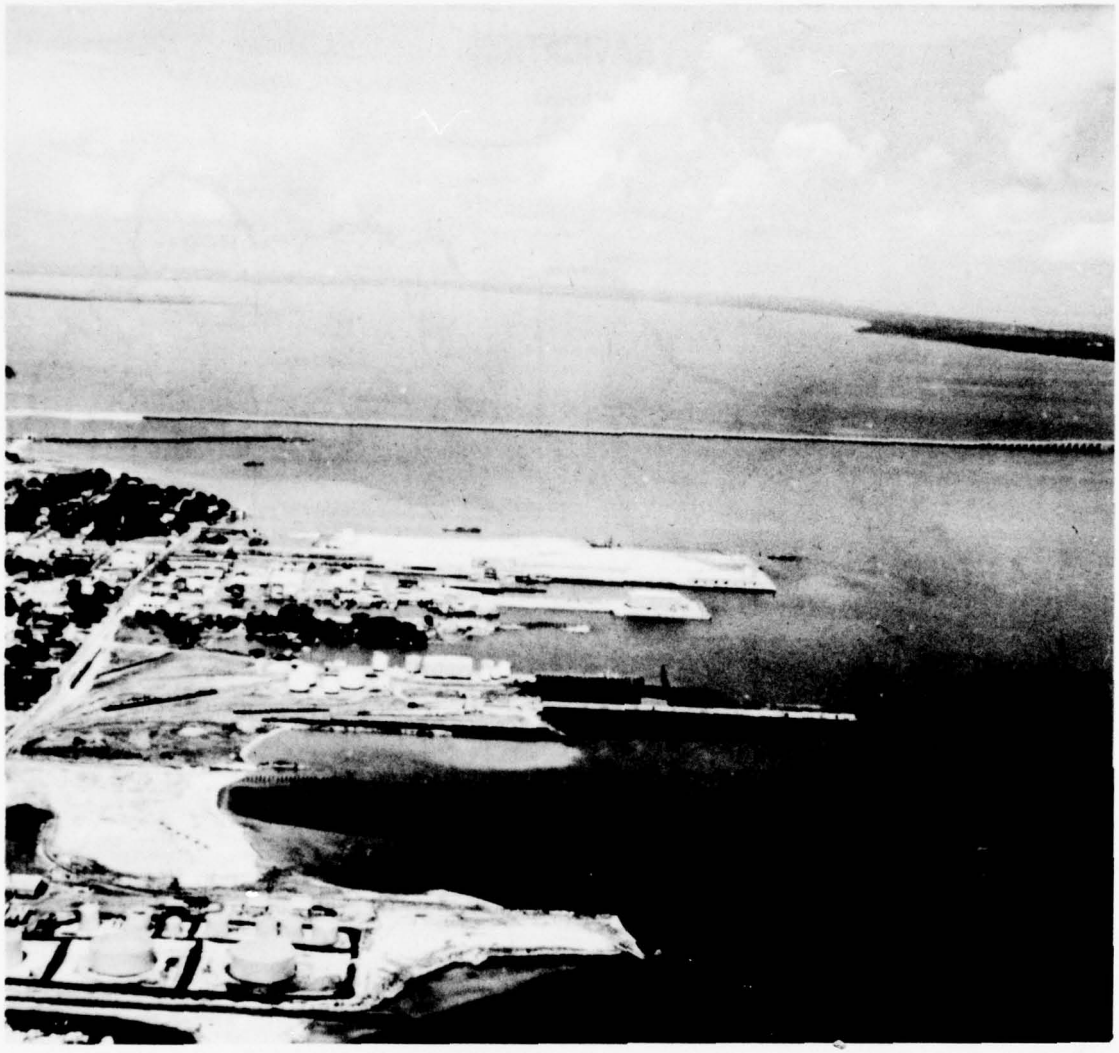


Figure 2.4 *Good Deep-Water Ports Such as Pensacola Attract Commerce.*

The Choctawhatchee River was improved by the Federal Government from Choctawhatchee Bay to Geneva and Newton, Alabama, between 1872 and 1906. During the same period Holmes Creek was improved to Vernon, Florida. Neither improvement is adequate for modern barge traffic, and no maintenance on either stream has been done for many years. There are no facilities for commercial navigation on the Choctawhatchee River or either of its principal tributaries, Holmes Creek and the Pea River. There are numerous landings and launching ramps for recreational traffic. A study by the Corps of Engineers is underway to determine whether improvement of the Choctawhatchee and Pea Rivers for navigation is warranted.

There are no existing navigation works on the Perdido River except for scattered small-boat landings, piers, and other recreational facilities.

The Escambia-Conecuh River was improved by the Federal Government from Escambia Bay to Andalusia, Alabama, in 1882. A modification was completed in 1960 which increased the channel dimensions in Escambia Bay and up the river to mile 7. Two industries on the Escambia River maintain terminal facilities for barge commerce. The Chemstrand Corporation has pro-

NAVIGATION

1960

Figure 2.5

Figure 2.6 *Gulf County Canal Connects the Intracoastal Waterway with the Gulf.*

vided a petroleum-products and petrochemical terminal for its plant at mile 7. The Gulf Power Company, at mile 4, maintains a slip, wharf, and other facilities for handling coal and fuel oil. A comprehensive study of the Escambia-Conecuh River for navigation and other purposes has been in a deferred status since 1952.

The Blackwater River was improved from its mouth to Milton, Florida, a distance of 10 miles, in 1916. A 9-foot by 100-foot channel was provided. In 1960, a petroleum-products handling facility with dolphins and a T-head wharf was constructed at mile 2.6. There are a number of facilities for recreational craft in the river below Milton and in Blackwater Bay.

The Port St. Joe Harbor has an entrance channel about 14 miles long from the Gulf of Mexico to the waterfront. Dimensions are 37 feet deep and 500 feet wide at the outer end, diminishing in width to 400 feet at the first bend, a distance of 4 miles, thence continuing at a depth of 37 feet and a width of 400 feet to the entrance of St. Joseph Bay, a distance of about 3 miles, thence continuing at a depth of 35 feet and a width of 300 feet to the north end of the turning basin at the waterfront, a distance of about 7 miles. The turning basin is 32 feet deep, 1,000 feet wide, and 2,000 feet long. In the turning basin is a harbor channel 35 feet deep, 250 feet wide, and 2,000 feet long, adjacent to the waterfront. Leading from the south end of the turning basin to deep water in St. Joseph Bay, is a channel 27 feet deep, 200 feet wide, and about 1 mile long.

Terminal facilities for Port St. Joe provide for both deep-draft and barge-borne commerce. Traffic totaled 1,620,000 tons in 1960, almost 99 percent of which was petroleum and petroleum products discharged by 101 tankers drawing from 20 feet to 33 feet and 4 shallow-draft vessels. The remaining 20,000 tons were handled by dry cargo vessels with drafts less than 30 feet. Traffic in Port St. Joe Harbor has remained relatively steady since 1951. Minimum tonnage was 1,538,000 in 1957 and the maximum reported was 1,944,000 in 1953.

Deep-draft facilities at Port St. Joe consist of three wharves with depths of 30 to 32 feet alongside and with a total usable length of 3,202 feet. One wharf receives bulk petroleum products for ship fueling and barge loading, and another for transshipment to inland points via an 8-inch pipeline terminating in Chattanooga, Tennessee. The third wharf receives packaged petroleum products. Total square footage of transit sheds at the three deep-water wharves is about 81,000 square feet and total bulk storage capacity for petroleum products is 1,257,000 barrels. Two of the three wharves have rail connections.

The port of Panama City is served by an approach channel 34 feet deep and 450 feet wide from the Gulf of Mexico to Hurricane Island, thence 32 feet deep and 300 feet wide across St. Andrew Bay to the harbor. A 10-foot by 100-foot channel in Watson Bayou provides for barge traffic to industries located there. Terminal facilities for deep-draft commerce are located along the waterfront on St. Andrew Bay and East Bay and for shallow-draft commerce on Watson Bayou.

Traffic in Panama City Harbor has also remained relatively steady since 1951. The total volume during the period has varied less than 17 percent from the 1,285,000 maximum tonnage reported in 1956 to the minimum of 1,070,000 tons reported in 1960. Of the 1960 tonnage, 79 percent was petroleum products. This was delivered by 35 tankers drawing from less than 18 feet to a maximum of 31 feet and 387 tank barges. Deep-draft tankers carried an estimated 270,000 tons, and barges carried the remaining

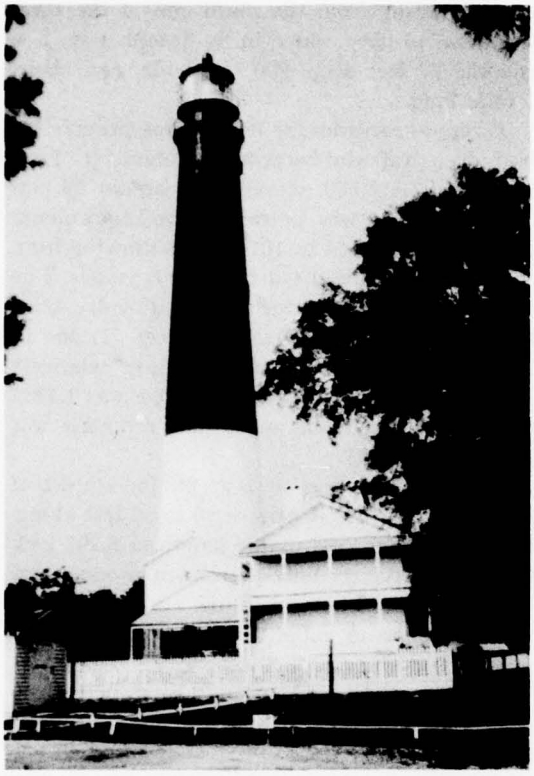


Figure 2.7 *Coast Guard Light at U. S. Naval Air Station, Pensacola, Florida, Is an Integral Part of Navigation.*

571,000 tons of petroleum products, 5,000 tons of which represented outgoing shipments.

The existing terminal facilities at Panama City consist of 20 shallow-draft wharves and 6 deep-draft wharves, the latter with space for 9 vessels. Four of the shallow-draft wharves handle oil and have a storage capacity for 143,000 barrels. Three deep-draft wharves handle oil and have a storage capacity for 996,000 barrels. One of the deep-water wharves handles liquid chemicals, and two of them handle other cargo.

The recently authorized project for the port of Pensacola provides for a 35-foot deep by 500-foot wide entrance channel, a 33-foot by 300-foot bay channel and two parallel approach channels leading to the inner harbor, and a 33-foot depth in the inner harbor channel. In 1959 the channel across the entrance bar was enlarged to 37 feet by 800 feet, and a bay channel 35 feet by 800 feet for a distance of 2,800 feet was dredged. A turning and anchorage basin 35 feet deep and 6,000 feet in diameter was also provided. At present the approach and inner harbor channels are 30 feet deep.

The authorized project under which Pensacola Bay improvements were made included a channel 21 feet deep and 100 feet wide from Pensacola Bay to the mouth of Bayou Chico, thence 20 feet deep and 100 feet wide to a point 4,400 feet upstream from the Escambia County Highway Bridge. A 20-foot depth in the existing turning basin at that point was also authorized. However, the maintained depth of the Bayou Chico project is only 15 feet in the outer channel, 14 feet in the inner channel and turning basin. The controlling depth in the inner channel at present is 10 feet. Further improvement to authorized depth has been deferred for restudy. Terminal facilities of the port are located along the city waterfront and along Bayou Chico.

At Pensacola, commercial traffic has followed a relatively steady pattern since 1951. It has varied from 681,000 tons in 1955 to 935,000 tons in 1959. Traffic totaled 792,000 tons in 1960. Typically, about 20 percent is deep-draft commerce handled by 3 deep-water facilities and the remainder, except for a small amount transported on rafts, is barge-borne. Petroleum products accounted for 53 percent of the 1960 traffic and were handled almost entirely by 6 barge terminals receiving petroleum products.

Terminal facilities at Pensacola consist of 23 piers, wharves, and docks, 12 of which are used for handling commerce, 9 for servicing vessels, and 2 of which are not in use. The 12 facilities for handling commerce are 2 general cargo deep-water piers, 6 piers and wharves with storage for 473,000 barrels of petroleum products from barges, and 4 wharves for seafood, logs, cement, and similar dry commodities from barges. Both deep-water piers are operated by the Pensacola Port Authority and have space for a total of 6 vessels.

Controlling depth in sections of the Gulf Intracoastal Waterway in 1960 was slightly less than authorized depths. In the reach from West Bay to Choctawhatchee Bay, the controlling depth was 11 feet; from Choctawhatchee Bay to Pensacola Bay, it was 11.4 feet; from Pensacola Bay to Mobile Bay, it was 10 feet; and in the Gulf County Canal, it was 7.6 feet. The East

Pass Channel and La Grange Bayou had 10 feet and 8.3 feet controlling depths, respectively.

Traffiic on the waterway in 1960 was reported by reaches as follows:

	Tonnages (1,000)		
	Total traffic	Through traffic	Petroleum and products
Apalachee Bay-Panama City	1,037	932	709
Panama City-Pensacola	2,519	1,648	1,786
Pensacola-Mobile Bay	3,142	3,135	2,215

Commercial traffic in East Pass Channel in 1960 amounted to only 829 tons. Most of this was fish and fish products. However, this was a 75 percent increase over the 1959 tonnage.

Traffic on the Gulf County Canal in 1960 totaled 56,370 tons, of which 7,977 tons was through traffic.

In La Grange Bayou, freight traffic in 1960 totaled 246,200 tons. This was over three times the total for the previous year. There was a 10-percent increase in gasoline shipments, but other classified commodities, including other petroleum products, decreased.

Commerce on the Choctawhatchee River began to decline in 1890, after construction of rail facilities in the basins. By 1910, it was confined almost entirely to the lower 28 miles of the river, and consisted principally of forest products. By 1935, commercial traffic had entirely disappeared from the Choctawhatchee River and its tributaries.

Small tonnages of pulpwood were moved on the lower 10 miles of the Perdido River until 1950, but no traffic has been reported since that year.

Commercial traffic on the Escambia-Conecuh River system has increased steadily since 1952. However, this traffic is confined to the lower 7 miles of the Escambia, and coincides with the limits of the 10-foot channel. Tonnages reported are as follows:

Year	Tons	Year	Tons
1953	3,106	1957	80,997
1954	23,467	1958	125,432
1955	31,117	1959	303,419
1956	57,414	1960	389,434

Traffic on the Blackwater River has varied from zero to nearly 13,000 tons per year since 1950. Tonnages were reported in only four of these years, and prior to 1960 these were special shipments of road and bridge construction materials. In 1960, the 11,121 tons reported consisted of petroleum products.

Needs and Opportunities

The basins topography is not conducive to development of inland navigation extensions. Inland commercial areas are adequately served by rail and highway. Future industrial activity is not expected to result in a need for inland waterways above the tidewater on any stream, at least until after the more attractive sites near the Gulf Intracoastal Waterway have been developed.

Deep- and shallow-draft facilities at Port St. Joe, Panama City, and Pensacola are expected to handle in 1975 a total tonnage almost double that of 1960. In the year 2000, the tonnage handled will be over three times the 1960 figure.

TABLE 2.2

1960 and Projected Traffic at Deep-Draft Ports (thousands of tons)

	1960	1975	2000
Port St. Joe, Florida	1,620	2,344	3,715
Panama City, Florida	1,070	2,583	4,965
Pensacola, Florida	792	1,439	2,685

Means of Meeting the Needs

Improvement of the deep-draft ports through expansion of facilities and enlargement and deepening of entrance channels, harbor channels, and turning basins would assist in handling projected traffic. Additional improvements to small-craft and barge channels at specific locations could meet needs for pleasure and commercial traffic.

Projections of future traffic on the Gulf Intracoastal Waterway are based on the assumption that authorized depths will be maintained or that controlling depths will not create operating limitations that would seriously affect the type or amount of cargo that will move on the waterway.

SECTION IV – RECLAMATION, IRRIGATION, AND DRAINAGE

General

In the humid Southeast, supplemental irrigation, properly used, is an insurance measure against droughts and provides the opportunity for expanding farming operations and stabilizing income.

Drainage is the principal method of reclaiming land for agriculture, forestry, and other uses in the Southeast.

Drainage problems are caused by the accumulation of excess water in depressions, and by the water table near the land surface. Clogging of natural and artificial drains as a result of vegetative growth and siltation and the reduced effectiveness of major streams from sedimentation are the major causes of adverse drainage conditions in the basins.

The terms reclamation and drainage are considered synonymous in this Report.

Existing Facilities and Programs

Irrigation

Some 53 farms out of 22,100 in the basins had irrigation systems in 1960. Approximately 4,000 acres were irrigated, principally by sprinkler systems. Some acres were irrigated by furrow or open-ditch method. A volume of about 2,400 acre-feet of water was used for irrigation. Ponds supplied the irrigation water for 1,100 acres, streams for 1,100 acres, and wells for 1,800 acres. Ninety-three percent of the irrigated land was in the Upper Coastal Plain of Florida and Alabama and the remaining 7 percent was in the Lower Coastal Plain. Baldwin and Escambia Counties in the Upper Coastal Plain of Alabama accounted for 53 percent of all the irrigated land.

More than 1,600 acres, or about 40 percent of the total irrigated area in 1960, consisted of cotton, peanuts, and small grain. Vegetable and pasture constituted about 20 percent each of the irrigated acreage. The remaining 20 percent of the irrigated area was in corn, tobacco, grass and hay, and nursery crops.

Drainage

Current drainage activities consist of farm drainage installations by individuals or by small groups of farmers. About 66,000 acres of land subject to water problems are already adequately drained. This has been done by installing open-main and lateral ditches and surface field ditches. Two drainage facilities benefiting 1,000 acres have been installed by the cooperative action of small groups of landowners. These are in the Lower Coastal Plain in Escambia County, Florida, and in Baldwin County, Alabama.

No major drainage improvements have been authorized by the Congress for construction by the Federal Government.

Needs and Opportunities

Irrigation

There are about 5.3 million acres of potentially irrigable land, including 2.2 million acres of cropland and pastureland, in the Choctawhatchee-Perdido basins.

Based on the 1954-60 trends in irrigated land use and the potential water supply, it appears that if these trends should continue 13,000 acres would be irrigated by 1975 and more than 29,000 acres by 2000. However, less acreage would be irrigated in the future if determined on the basis that incremental returns to the farmer, based on long-term projected prices would at least equal the incremental operation, maintenance, and replacements costs without consideration of secondary effects or intangibles. This general guide was considered acceptable for reconnaissance studies although it was realized that followup studies of individual irrigation development would be subject to standard and more detailed evaluations.

Generally, ample water is available for irrigation purposes. Water requirements could be provided by streams, wells, and from farm ponds.

Studies of the upstream watershed areas indicate that some of them have potential for development of irrigation water supplies by collective action. However, no storage projects for irrigation water supply alone appear justifiable in the foreseeable future. Further study and investigations will be necessary to determine conclusively if the projects are feasible under fu-

DRAINAGE

1960

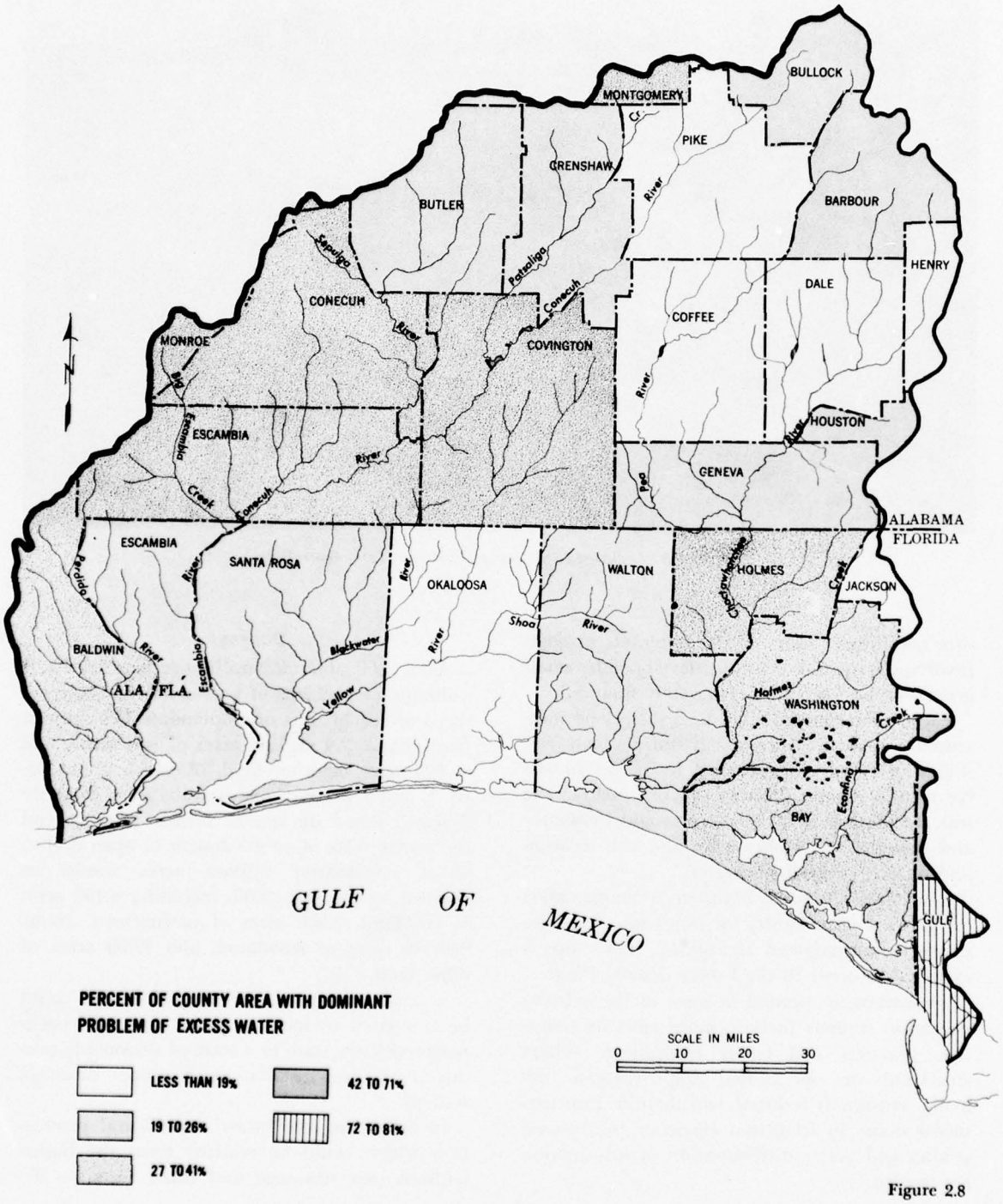


Figure 2.8

Figure 2.9 *Drainage Is an Important Part of Farm Operations.*

ture conditions. Most of the potential projects involving irrigation could be developed by small groups or by individuals, privately financed.

Farm potentials for irrigation should be individually analyzed. Factors determining the feasibility of using supplemental irrigation in the basins as a regular farming practice include the soil, the kinds of crops grown, drought frequency and seasonal water shortages, and the location and quality of available water.

The Upper Coastal Plain of Alabama offers the greatest opportunity for irrigation. Some increase in the irrigated acreage of truck crops is expected to occur in the Lower Coastal Plain.

Improvements needed in some of the existing irrigation systems include more efficient irrigation practices and better equipment. Where structural or operational improvements are made, erosion is reduced and definite improvements occur in irrigation efficiency. Additional studies and better dissemination of information are needed.

Drainage

As of 1960, about 2.2 million acres of land had a dominant problem of excess water. This consisted of 56,000 acres of cropland, 95,000 acres of pastureland, 2.0 million acres of woodland, and 65,000 acres of other land, of which about 33, 20, 1, and 7 percent, respectively, were properly drained. Based on trends, farmer interest, and the present rate of establishment of open drains, about one-quarter million acres would be drained by the year 2000, including 4,400 acres of cropland, 9,000 acres of pastureland, about 230,000 acres of woodland, and 7,000 acres of other land.

A large percentage of the wetland soils could be converted to more intensive use, or from a nonproductive state to a state of reasonable production by the installation of proper drainage systems.

In estimating the future agricultural production which could be realized from the basins without new drainage and other resource de-

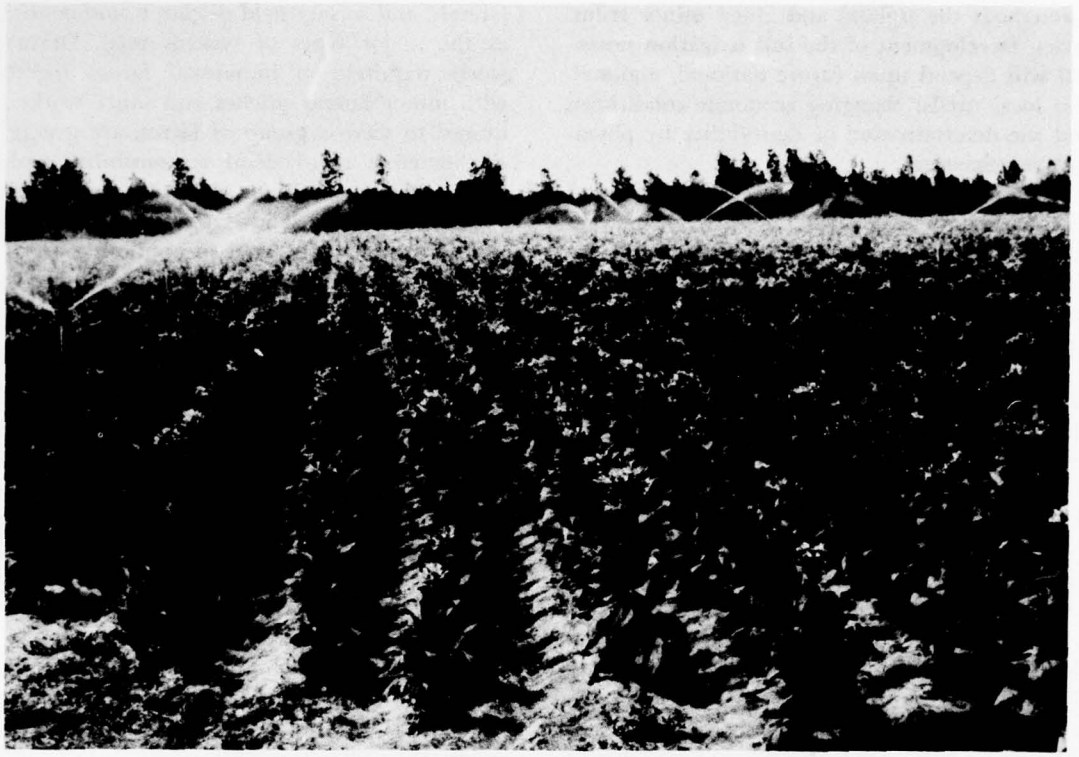


Figure 2.10 *Sprinkler Irrigation Improves Crop Quality, Yield, and Dependability.*

velopment, consideration was given to the 309,000 acres of land in the basins which might be withdrawn from agricultural uses by the year 2000. While offsetting land conversions may be made, increases in demand for crops and pasture will require major increases in production per acre. There are, therefore, opportunities for additional drainage to meet the production needs. For example, a significant part of the projected increased need for 207 million pounds of tobacco, 72 million pounds of cotton, and 11 million bushels of corn could be provided through drainage cheaper than on other land not requiring drainage.

In 1958, more than 545,000 acres of the cropland had a dominant problem of unfavorable soil conditions such as low fertility, stoniness or shallowness to rock, low moisture holding capacity, or some other condition that limits root development. By 2000, only 300,000 acres of such land probably will be used for cropland. The reduction of 245,000 acres of cropland could be partially offset by draining wetlands better adapted for crop production and for facilitating soil conservation adjustments in land use elsewhere. Such land-use conversions and improved drainage would frequently provide opportunities for increasing farm income, replacing marginal farmland, and increasing the efficiency of farm operations.

Few tile drains have been installed, but as more intensive use is made of the land, tile drainage would probably be used to a greater extent. Pump drainage has a potential where gravity outlets are not available in the lower coastal areas.

Means of Meeting the Needs

Irrigation

No large irrigation projects are expected in the foreseeable future. Indications are that irrigation would be carried out on an individual-farm basis. Most of the irrigated acreage is expected to consist of scattered or isolated tracts

throughout the upland and along minor tributaries. Development of the full irrigation potential will depend upon future national, regional, and local needs; changing economic conditions; and the determination of desirability by potential beneficiaries.

The continuation of the technical, loan, and cost-sharing assistance available through the programs of the U. S. Department of Agriculture could expedite the realization of full benefits of irrigation developments and water-management principles and techniques.

Accelerated educational services could be provided as technological advances in equipment and irrigation practices and study findings are known.

To facilitate irrigation development, studies should be provided for water requirements and consumptive use of water by agricultural crops; the moisture extraction pattern within the crop root zone; water intake rates; hydraulic characteristics of surface methods of irrigation; available water-holding capacities in soil profiles; and climatological records correlated with soil-moisture-holding capacities and plant use.

From the national and Southeast River Basins area standpoint, there appears to be no urgent need to promote large-scale irrigation project development in the Choctawhatchee-Perdido basins for increased crop production. However, individuals in the future, as in the past, will prefer to undertake irrigation as one of the means of increasing net economic returns from agricultural land use.

Drainage

Development of farm drainage systems and farm-by-farm application of water management principles and techniques should be considered to realize the full benefits of drainage. These programs could result from private initiative and expenditures. Onfarm outlet channels, mains, laterals, and surface field ditches would continue as the major types of systems used. Drainage works required on individual farms, together with minor lateral ditches and other works required to serve a group of farms, are generally considered a non-Federal responsibility within the financial capabilities of local interests. Additional tile mains and laterals and pumping should also be considered in applicable areas.

In addition to the individual drainage systems, multiple-purpose flood prevention and drainage projects can be used to alleviate drainage problems requiring project facilities.

Development of the wetlands would require: (1) Full participation by landowners who have the responsibility of deciding whether or not to drain; (2) provision for adequate outlets for all individual onfarm and small group drainage; (3) drained land capable of producing food and fiber more efficiently than alternative lands; and (4) markets adequate to handle increased production due to drainage.

Alternative plans for drainage could involve essentially a change in areas drained, or adoption of other technological improvements or other management practices.

The existing technical and financial assistance programs of the U. S. Department of Agriculture could be utilized in the installation of drainage facilities.

Full consideration should be given by landowners and governmental interests involved to all alternative uses before detailed plans are decided upon.

Accelerated educational services could facilitate drainage developments by making known the results of field trials on drainage practices, methods, equipment, operations, and maintenance.

Additional study findings on drainage problems and solutions could facilitate drainage developments.

SECTION V – HYDROELECTRIC POWER AND INDUSTRIAL DEVELOPMENT

General

Deep-water harbors, extensive beach areas, ample water supplies, adequate supplies of electric power, an ample labor force, and permanent military installations have fostered the development of an industrial complex and extensive service-oriented enterprises in the Florida part of the basins. Adequate labor, productive land, abundant supply of water, long growing season,

ELECTRIC POWER FACILITIES

1961

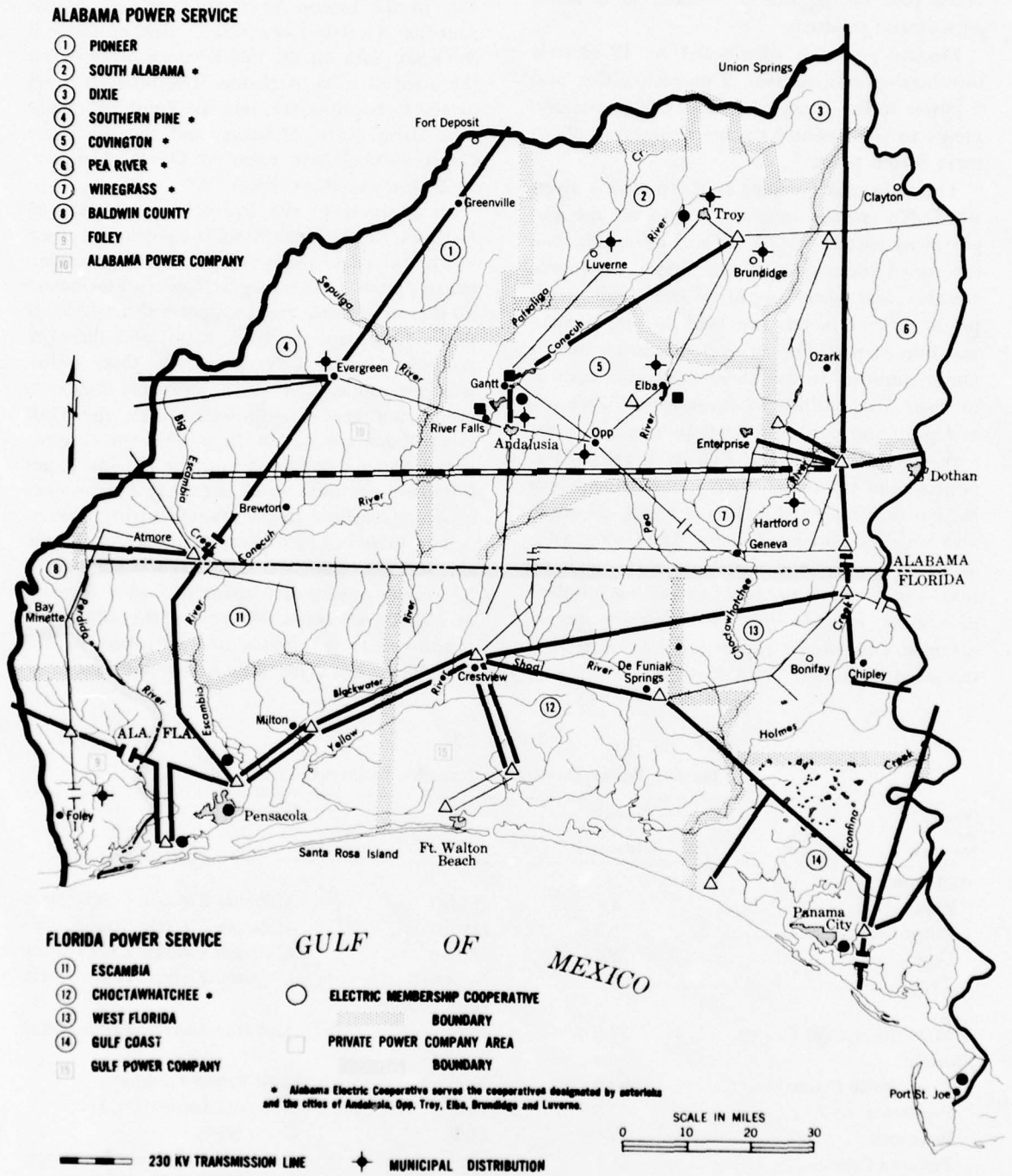


Figure 2.11

and available low-cost electric power have contributed to industrial development in the Alabama part of the basins oriented to utilizing agricultural products.

Electric power is distributed by 12 electric membership cooperatives, 9 municipalities, and 2 power utility companies. The energy requirements in the basins have been doubling about every 8 to 9 years.

The industrial complex in the basins is diversified. No specific industry dominates the employment pattern. Apparels and chemicals, two diversified industries, are the major employers. Lumber and wood products, pulp and paper products, and metals are next in employment and importance. The apparel industries are the major employer in the Alabama portion because of their adaptability to rural areas. Chemical and pulp and paper products industries are the major employers in the Florida portion. The largest gains in manufacturing employment over the basins is expected to be the metal, chemical, and pulp and paper industries. The Gulf coast is a popular tourist and recreation area and is expected to continue to attract increasing numbers of visitors, who, in turn, will require service-oriented enterprises. Industrial development is discussed in Section IV of Part One.

Existing Facilities and Programs

There are three hydroelectric generating facilities in the basins. They are operated by the Alabama Electric Cooperative. One of these is the Elba plant on the Pea River, 4 miles below the town of Elba, Alabama. The other two are on the Conecuh River; one the Point "A" plant near River Falls, Alabama, and the other the Gantt hydroelectric plant at Gantt, Alabama, about 6 miles above Point "A."

In addition to the hydroelectric generating facilities, the Alabama Electric Cooperative operates an internal combustion plant and a thermal-electric plant. Generating facilities in Florida are all thermal-electric and are operated by the Gulf Power Company, the U. S. Navy, and three industries. The U. S. Navy and the three industries generate electrical energy to meet their own needs, but are interconnected with the Gulf Power Company system. In general, the International Paper Company's and the St. Joe Paper Company's generation of energy is a byproduct of steam required in the manufacturing process.

The total installed power capacity in the basins in 1959 of 302,000 kilowatts was augmented by sources outside the basins to supply demand of 362,000 kilowatts. Power for the additional requirements in Florida are furnished by the Gulf Power Company. The Alabama Power Com-

TABLE 2.3

Electric Power Development in the Basins—1959

Name or location	Capacity (1,000 kilowatts)	Type	Owner
Alabama			
Elba	1.4	Hydro	Alabama Electric Cooperative
Point "A"	5.2	Hydro	Alabama Electric Cooperative
Gantt	2.4	Hydro	Alabama Electric Cooperative
Troy	1.5	Internal combustion	Alabama Electric Cooperative
McWilliams (at Gantt)	37.0	Fuel	Alabama Electric Cooperative
Florida			
Crist (near Pensacola)	150.0	Fuel	Gulf Power Company
Pensacola	1.5	Fuel	Newport Industries, Inc.
Pensacola	21.0	Fuel	U. S. Navy
Panama City	41.5	Fuel	International Paper Company
Port St. Joe	40.5	Fuel	St. Joe Paper Company
Total	302.0		

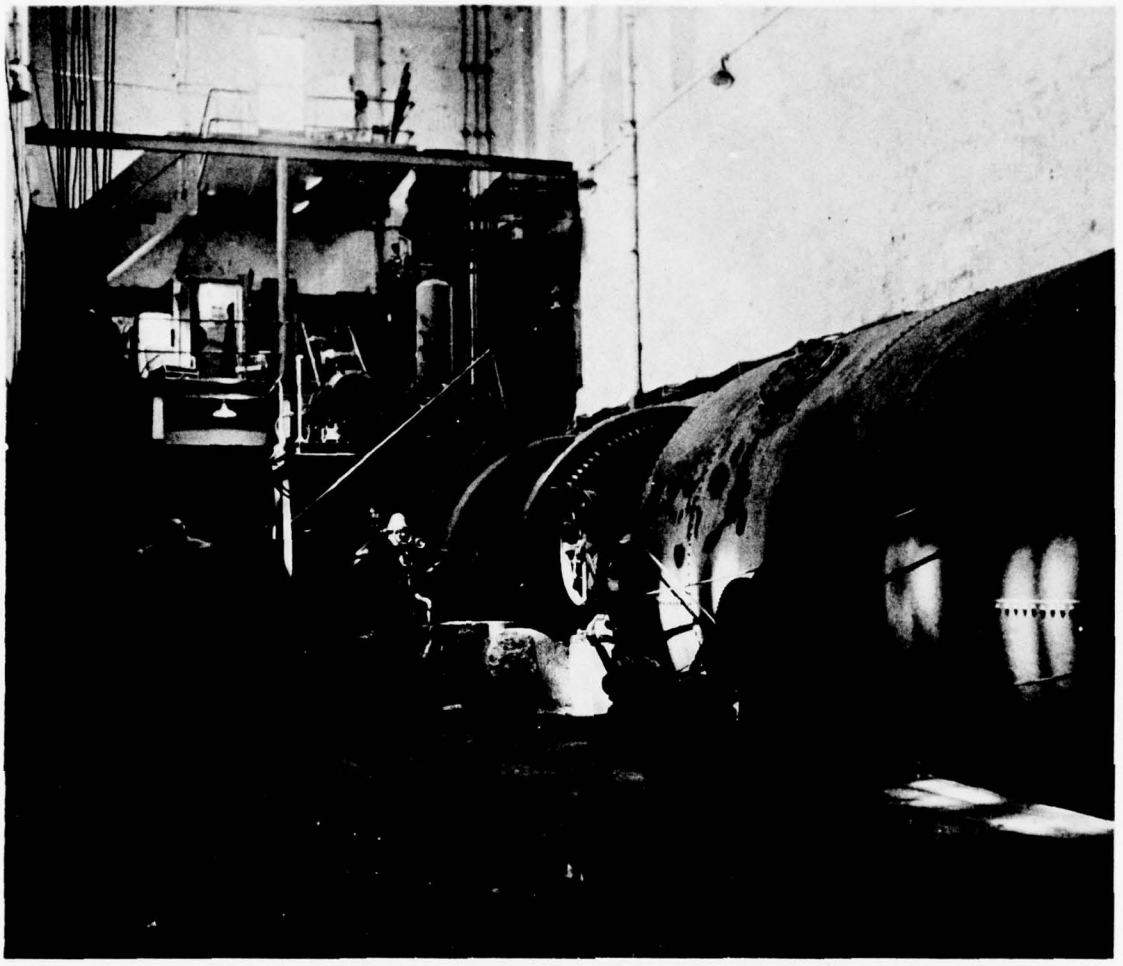


Figure 2.12 *Elba Powerplant — Horizontal Turbine and Generator — Built in Early 1900's and Still Operating.*

pany furnishes the additional power needed from its integrated system in the Alabama part of the basins. Electric power is exchanged among the power producing companies over high-voltage tie lines. In cases of emergency, or to meet normal loads, electric energy is readily transmitted from one area to another.

The Alabama Electric Cooperative furnishes all of the wholesale electric power requirements of two electric membership cooperatives, six municipalities, and two industrial companies and furnishes part of the electric power requirements of four other electric membership cooperatives in the basins. Most of the power produced by the Alabama Electric Cooperative is marketed in the basins. Electric power requirements of other municipalities and electric membership cooperatives in the Alabama part of the basins are furnished by the Alabama Power Company. The Alabama Power Company operates 489,700 kilowatts of hydroelectric capacity and 1,436,250 kilowatts of steam electric capacity. An additional 250,000 kilowatts of capacity is available to the company from the Southern Generating Company jointly owned with the Georgia Power Company. About 6 percent of the Alabama Power Company's market is in the basins.

The Gulf Power Company furnishes all of the electric power requirements of three electric membership cooperatives and most of the electric power requirements of a fourth electric membership cooperative in the Florida portion of the

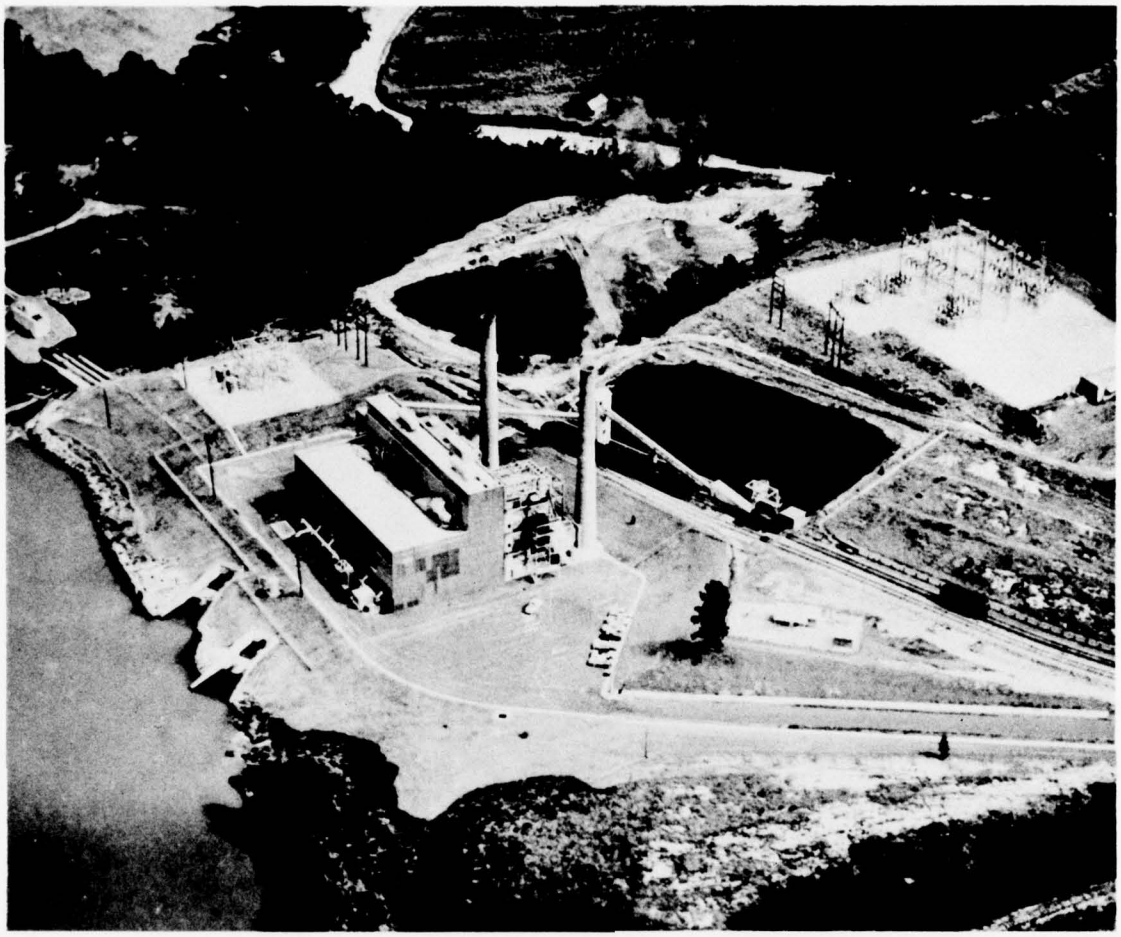


Figure 2.13 *McWilliams Steam Powerplant at Gantt, Alabama, Supplies Power Within the Basins.*

basins. Except for customers of the electric membership cooperatives, the Gulf Power Company serves all of the basins area in Florida. The power company operates 230,000 kilowatts of steam electric capacity in its system. About 95 percent of the company's market is in the basins.

Needs and Opportunities

Future electric power requirements are projected from trends of customer usage and analysis of the factors which affected the trends. The past load growth of the electric membership cooperatives and those for municipal systems was analyzed as to customers and by usage per customer. Other factors considered were population trends, rates of distribution line extension, and rates of capital expenditures. Data from the power company portion of the basins area load were analyzed as to customer classification for the service area in the basins. The projection has considered load saturation, especially of residential loads, and the conversion to labor-saving machinery, including automation and improved manufacturing methods.

The electric energy capacity demand for 1959 totaled 362,000 kilowatts, based on a 60.1 percent load factor. Projected demands for 1975 amount to 1,133,000 kilowatts, and for the year 2000, 3,116,000 kilowatts. Electric energy requirements in 1959 were 1.9 billion kilowatt-hours and are expected to increase to 6.3 billion kilo-

watt-hours by 1975 and to 17.3 billion kilowatt-hours by 2000.

The projections reflect the rural to urban shift in population, the increase in industrial development, and the commercial development.

Means of Meeting the Needs

There are no economically justified single-purpose hydroelectric potentials in the basins. However, hydroelectric possibilities should be considered in any dam and reservoir constructed in the basins. Future electric power loads in the Alabama portion of the basins will be met largely by imports from sources adjacent to the area, and in the Florida portion largely by imports or by fuel plants.

New transmission lines and distribution lines could be constructed as needed to meet new and increasing electric power demands. The capacity of tielines among the electric power producing companies could be increased, thus allowing for greater interchange of energy and increased emergency reserves.

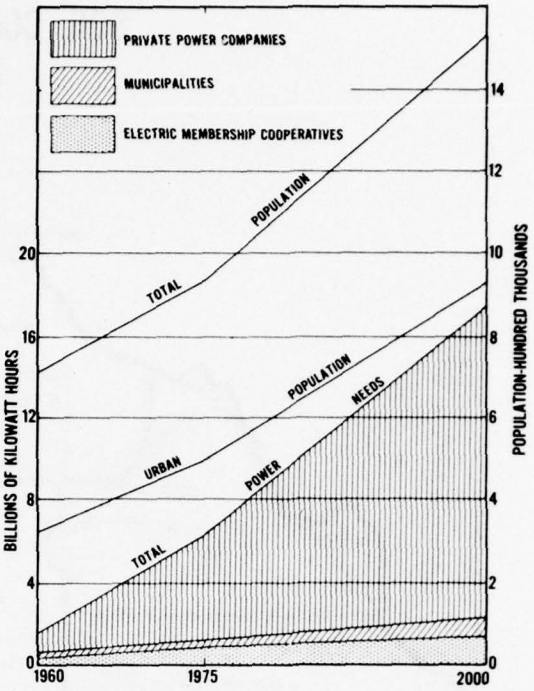


Figure 2.14 *Power Needs and Population.*

SECTION VI – SOIL CONSERVATION AND UTILIZATION

General

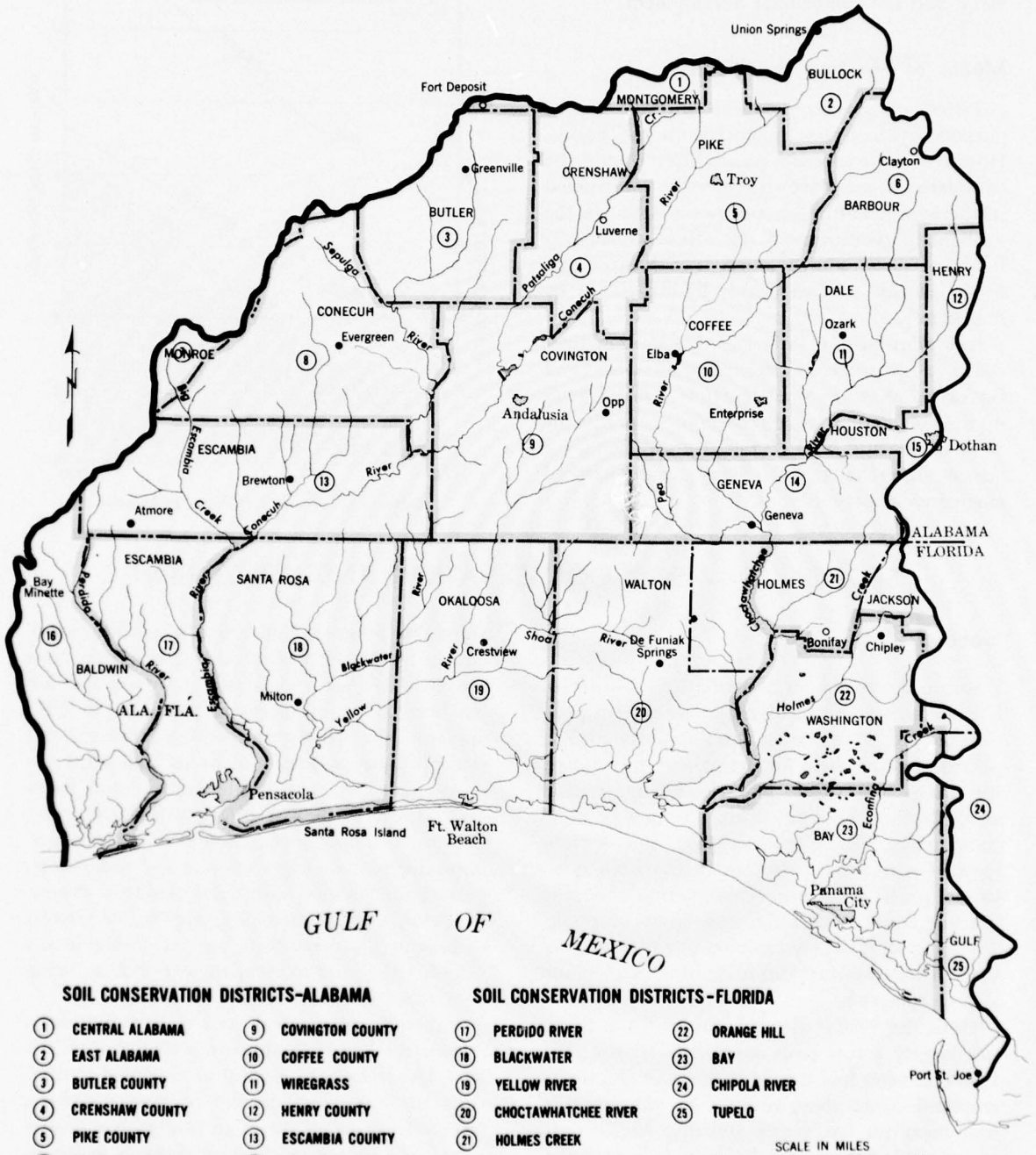
Soil conservation and utilization consists of both enduring and recurring or short-term practices to protect the basic land resource and to provide a stable base for permanent agriculture. Enduring conservation practices include critical area planting, land smoothing, terracing, pond construction, grassed waterways, and various types of permanent plantings. Recurring conservation practices include conservation cropping systems, contour farming, and cover cropping. This Section is largely confined to a discussion of the soil conservation and utilization of cropland and pastureland.

Until the 1930's, the agriculture of the basins was largely a row crop enterprise. By the mid-1930's, erosion had damaged much of the basins cropland. Since then, interest in soil conservation measures has grown steadily. As a result, considerable progress has been made in conservation of cropland and pastureland. Combined Federal, State, and local agricultural efforts have aided this progress. Conversion of erodible cropland to grassland and woodland has been most rapid in the last two decades. This conversion has been aided by incentive payments to farm operators, by comparatively high livestock and wood products values, and by technological improvements in agricultural practices and measures. However, the use of land treatment practices has not been rapid enough to overcome or minimize past damages and, at the same time, protect the present basic land resource. Protection of the land resource is needed in the interest of present-day agriculture and as a step in developing the land to meet the expected growing demands for agricultural products.

Although agricultural land has many classifications, the Land Capability Classifications of the U. S. Department of Agriculture are used to illustrate the types and degrees of land problems. Capability classification is an interpretive grouping of soils for agricultural purposes. The groupings are based on a physical inventory of the soil characteristics, the slope, and the degree of ero-

SOIL CONSERVATION

1960



SOIL CONSERVATION DISTRICTS-ALABAMA

1. CENTRAL ALABAMA
2. EAST ALABAMA
3. BUTLER COUNTY
4. CRENSHAW COUNTY
5. PIKE COUNTY
6. BARBOUR COUNTY
7. MONROE COUNTY
8. CONECUH COUNTY
9. COVINGTON COUNTY
10. COFFEE COUNTY
11. WIREGRASS
12. HENRY COUNTY
13. ESCAMBIA COUNTY
14. GENEVA COUNTY
15. HOUSTON COUNTY
16. BALDWIN COUNTY

SOIL CONSERVATION DISTRICTS-FLORIDA

17. PERDIDO RIVER
18. BLACKWATER
19. YELLOW RIVER
20. CHOCTAWHATCHEE RIVER
21. HOLMES CREEK
22. ORANGE HILL
23. BAY
24. CHIPOLA RIVER
25. TUPELO

BOUNDARY

SCALE IN MILES
0 10 20 30

Figure 2.15

TABLE 2.4

Distribution of Land Use by Land Capability Classification—1958
(percent)

Land use	Land Capability Classification								
	I	II	III	IV	V	VI	VII	VIII	Total
Cropland	9.2	39.6	35.2	11.6	0.3	3.3	0.8	....	100
Pasture	5.5	26.8	36.6	16.8	4.2	6.5	3.6	....	100
Forest	1.4	12.0	27.2	17.4	23.3	7.2	10.9	0.6	100
Other	2.3	17.7	35.4	18.7	4.7	5.1	4.1	12.0	100
Basins average	3.3	18.8	29.7	16.3	17.0	6.5	8.1	0.5	100

sion. Soils in each class have limitations and management problems of about the same degree.

Soils in Classes I, II, III, and IV are suitable for cultivated crops, pasture, range, woodland, and wildlife. Class I soils have few limitations that restrict use. Class II soils have some limitations that reduce the choice of plants or require moderate conservation practices. Class III soils have severe limitations that reduce the choice of plants, or require special conservation practices, or both. Class IV soils, if cultivated, require very careful management and are not suitable for row crops year after year.

Classes V, VI, and VII soils normally should be used for pasture or range, for woodland, or for wildlife. Class V soils have little erosion hazard, but they have other limitations that restrict the kind of plants that can be grown and prevent normal tillage of cultivated crops. Class VI soils have severe limitations that make them unsuited for cultivation of crops. Class VII soils have severe limitations that make them unsuited for cultivation of crops and restrict their use largely to recreation and wildlife.

Class VIII soils have limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, water supply, or esthetic purposes.

Classifications for the land area of the basins devoted to agricultural uses in 1958 are shown in Table 2.4.

Nearly 96 percent of all cropland was in Land Capability Classes I through IV. The remaining cropland was in Land Capability Classes V through VII. About 3 percent of all land in the basins is in Land Capability Class I. The remainder of the land has some restrictions in use and normally has some erosion, unfavorable soil condition, or water problems.

Existing Facilities and Programs

As of January 1958, some 1,234,000 acres of cropland and pastureland and 130,600 acres of other agricultural land had dominant erosion problems. At the same time, some 690,000 acres of cropland and pastureland and 154,800 acres of other agricultural land had dominant unfavorable soil condition programs. Some of the erosion and unfavorable soil problems involve the same acreage. About 186,300 acres of cropland and pastureland and about 8,200 acres of other agricultural land had no problems that limited use.

As of 1960, some 3,100 farm ponds had been constructed in the basins for single or combination usages such as livestock water, irrigation water storage, fire protection, and fishing. The average size was less than 4 acres of surface. Less than 10 percent of these ponds were used for livestock water, only about 1 percent for irrigation water storage but nearly all of the ponds provided some fishing.

Several major State and Federal soil and water conservation and utilization programs are in operation in the basins. The programs provide cost sharing, credit, technical assistance, and education and information services.

The soil conservation districts in the basins operate under State charter and coordinate various kinds of State and Federal aid that are available to farmers. Many private organizations and groups make their services available to these districts.

Needs and Opportunities

To meet the estimated food and fiber production needs projected for the basins to the year 2000, overall agricultural production must double. In 1959, the land area of the basins totaled

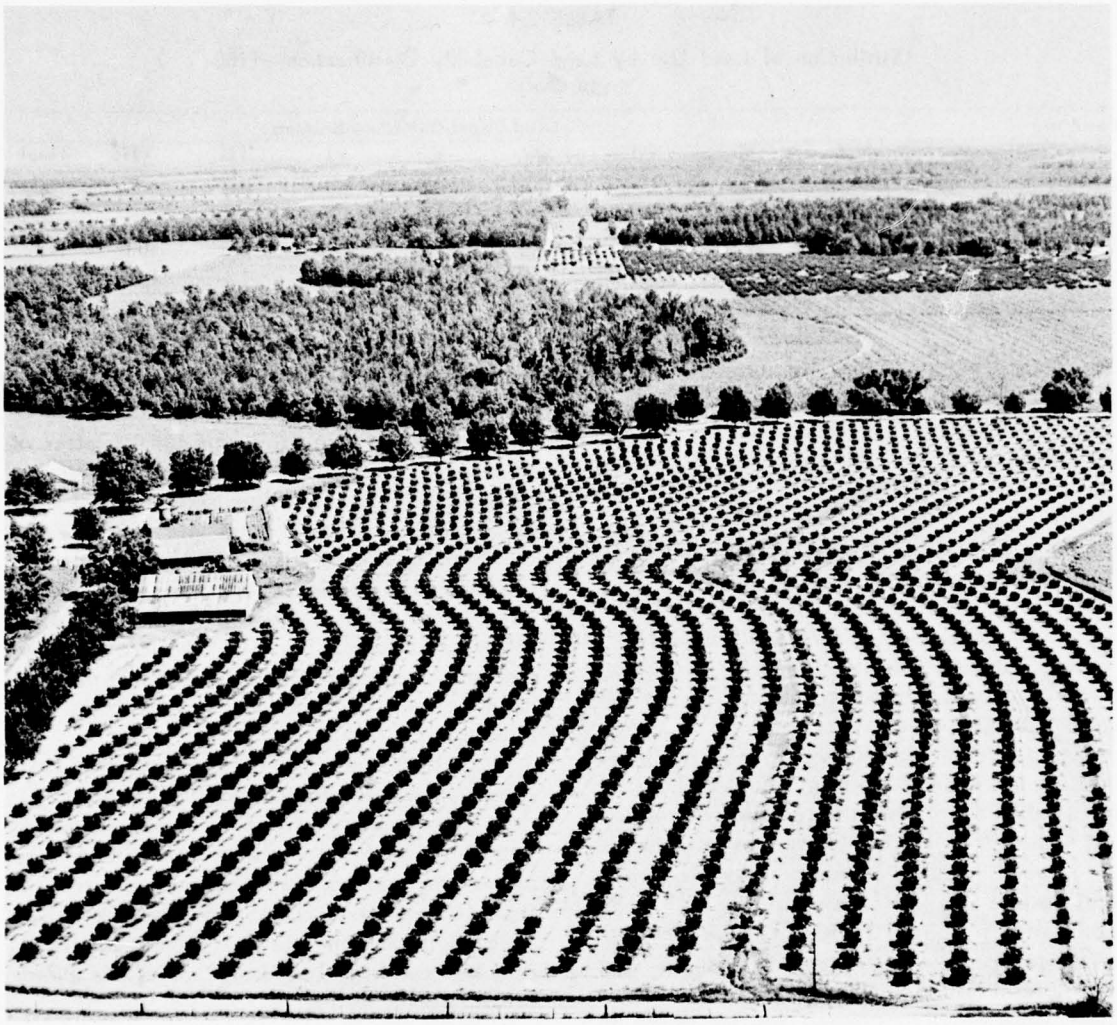


Figure 2.16 *Orchard on Contour in Southern Alabama Typifies Modern Cropping Practices.*

9,096,000 acres. Of this, some 8,435,000 acres were used in the production of agricultural products, including forest products. By the year 2000, an estimated 8,071,000 acres are expected to be available for agricultural production. There will be a need for some resource development and for more efficient land use. Essential elements of resource development include improved levels of management, conservation practices, and the adoption of technological improvements.

The Choctawhatchee-Perdido basins agriculture has long been a vital part of their economy. Row crop acreages in the future may decrease slightly, but livestock numbers and pasture acreages may increase. Some 1,806,000 acres were in cropland and pastureland in 1959. By 2000, 2,166,000 acres are expected to be used as cropland and pastureland. This would increase the needs for conservation treatment of openland. By year 2000, about 58 percent of the land expected to be used for cropland and pastureland would be benefited by conservation treatments.

Opportunities exist for conservation programs designed to: Achieve needed treatment of eroded and depleted soils; protect land against erosion and other deterioration; protect and improve farm woodland and grassland; conserve moisture; reduce flood and sediment damage; improve the

quality and dependability of water; and apply conservation techniques in the management of water and increase overall efficiency of land management.

By year 2000, about 400,000 acres of cropland are expected to have erosion problems and about 198,000 acres of cropland are expected to have unfavorable soil conditions. Conservation measures would benefit a total of about 645,000 acres of pastureland and rangeland. Some of the treatments for lands expected to be used for pastures by year 2000 and the estimated acres that would be benefited are shown in Table 2.5.

TABLE 2.5

Treatment or Control for Pastureland (thousands of acres)

Establish or reestablish vegetation	477
Improve vegetative cover	222
Reduce overgrazing	285
Protect from fire	28
Erosion problems	69
Rodent control	8
Noxious plant control	167

Some of the above treatment or control measures may be expected to be applied on the same acreage. Solutions include management of soil, water, livestock, and vegetation.

Erosion damage is particularly severe in the Red Hills of Alabama. A study of 3,400 acres in the Red Hills indicates that 90 percent of the sediment and erosion damage is attributable directly to erosion. A reasonably accurate estimate of the total amounts of sediment and erosion damage occurring in the basins will necessitate a considerable amount of field study and investigation.

By the year 2000, about 80 percent of the basins conservation treatment needs on both cropland and pastureland is expected to be located in the Upper Coastal Plain.

Additional farm ponds are expected to be needed in the basins to provide a share of the small impoundment fishing demands and provide water for livestock, irrigation, recreation, and a part of the conservation needs of many farms. By 2000, the number of farm ponds should increase to almost 10,000. This would add some 32,800 acres of additional surface water on farms.

Land conversion, or the shift in type of land use, is expected to be a continuous process in the basins. About 74,300 acres in Land Capability Classes V to VII were planted to crops in 1959. Most of this acreage will likely shift to land more suited to cropping. Other shifts would be needed to fit a particular crop to a specific soil type. Still other shifts would be needed to replace land lost to urban growth and development. By 2000, some 184,100 acres of land now in pasture, woods, and other uses would need to be converted to cropland. Also, 243,800 acres of cropland, woodland, and other land would need to shift to pastureland and rangeland. These probable land use conversions conform to both limitations of the soil conditions in the basins and to trends indicated by past developments under similar conditions.

Data on woodland needing conservation treatment are included in Section VII, Forest Conservation and Utilization.

Means of Meeting the Needs

To accomplish the land-use changes and meet the conservation treatment needs indicated in the foregoing sections, sound soil and water conservation practices and high-level management would be necessary. The land-use changes and conservation treatment could restore and improve the soil resource base to the point where it would be protected and soil losses reduced.

Installation of conservation measures is expected to depend on the changing need for agricultural products, general economic conditions, and future policies of Federal, State, and local agencies. The necessary measures include treatment of lands used primarily for crop production. These measures also include plant-culture practices on lands that are currently irrigated or drained.

The following measures, excluding woodland conservation measures, are essential to attain a satisfactory level of protection for cropland, pastureland, and rangeland. These are satisfactory land treatment measures when applied in proper combinations, in sufficient intensity, and to proper land use.

To meet cropland conservation treatment and utilization needs, high-level management should include: (1) Proper choice and rotation of

crops; (2) control of excess water with drainage, vegetated waterways, contour operations, and structures; (3) use of correct amounts of commercial fertilizer, lime, and manure; (4) maintenance of organic matter at high levels; (5) improvement and maintenance of soil plant nutrients, and soil moisture; (6) selection of proper planting and seeding times; (7) improved tillage methods; (8) control of weeds, insects, and plant diseases; (9) proper combinations of soil and water conservation practices and measures; and (10) use of farm ponds.

High-level management for pasture and range includes management of soil, water, livestock, and vegetation. Soil management includes the application of lime, nitrogen, phosphate, potash, and other nutrients in the amounts determined by soil tests. Nutrients should be applied in sufficient quantities to grow plant cover that will protect the soil and provide for livestock forage. The number of livestock and the grazing period should be regulated so that pasture plants can grow vigorously during the grazing season. Vegetative management should include proper mowing, the use of chemicals for weed and brush control, and fire protection. Water management should include an adequate number of properly distributed farm ponds.

To aid in meeting the conservation needs, additional study is required. Data on costs and returns of conservation farming practices and systems are needed. Additional studies should be instituted on the conversion of land to alternative purposes. Intensive studies should be made on how to reduce and avoid possible detrimental effects of land use shifts. Studies are needed of the institutional, educational, and social factors that influence farmers to apply, or not to apply, soil conservation practices and plans. Study is needed to enable technicians to make improved estimates of the need for cost sharing for various practices in watershed programs.

Continuing study on erosion control and soil management is needed to develop: (1) Erosion equations with factors to predict erosion losses under specific soil, slope, and other conditions; (2) additional data to determine proper stripcropping widths, grade, and directions; (3) design factors for maximum allowable terrace and row grades; (4) more precise data to determine the length of time grass-legume sods should occupy the land for maximum benefit to soils and crop yields; (5) reasons for increases or decreases in yield following lime applications; and (6) the best times and methods for planting cool-season cover crops on cropland and in pecan orchards.

Selected plant management research studies are needed to insure that livestock production continues as an important enterprise.

Technical assistance available under current programs is expected to be sufficient to carry out the soil and water conservation practices involved in the expected land use changes until the year 2000. Technical assistance is available for planning, installation, and maintenance, but in some instances assistance is limited to planning. Because of this type of planning and programming, no attempt has been made to define technical assistance specifically by practices or measures.

Increased emphasis should be given annually to designing financial assistance programs to encourage those conservation practices which provide the most enduring conservation benefits practicably attainable on lands where they are to be applied.

Land treatment measures are normally applied farm by farm under going agricultural and conservation programs. Accelerated rates of providing land treatment and stabilization of critical areas may be undertaken under the provisions of Public Law 566, 83d Congress, the Watershed Protection and Flood Prevention Act, where such action could help solve the problem in designated watersheds.

SECTION VII – FOREST CONSERVATION AND UTILIZATION

General

The Choctawhatchee-Perdido basins are predominantly forested and the production of forest products plays an important part in the basins economy. Timber production could be increased two and one-half times by the year 2000 to meet expected needs for wood products.

Figure 2.17 *Planting Trees for the Future in Blackwater River State Forest, Florida.*

Existing Facilities and Programs

Forests occupy 6,629,000 acres, or 73 percent, of the basins land area. Some 3,107,000 acres, or 83 percent of the land area, in Florida are in forest cover as compared to 3,522,000 acres, or 66 percent, in the Alabama portion of the basins. Ten thousand acres of forest land are classed as noncommercial.

Approximately 629,000 acres of commercial forest land are in Federal ownership. This includes 84,000 acres in the Conecuh National Forest in Alabama; 426,000 acres in Eglin Air Force Base in Florida; and 119,000 acres in other Federal holdings. Public non-Federal ownerships total 205,000 acres of forest lands, including 181,000 acres in the Blackwater River State Forest administered by the Florida Forest Service and 24,000 acres in other non-Federal public holdings. The remaining 5,785,000 acres of commercial forest land are privately owned, of which 1,100,000 acres are owned or under long-term leases by pulp and paper companies; 1,851,000 acres are part of farm enterprises; and 2,834,000 are held by nonresident owners.

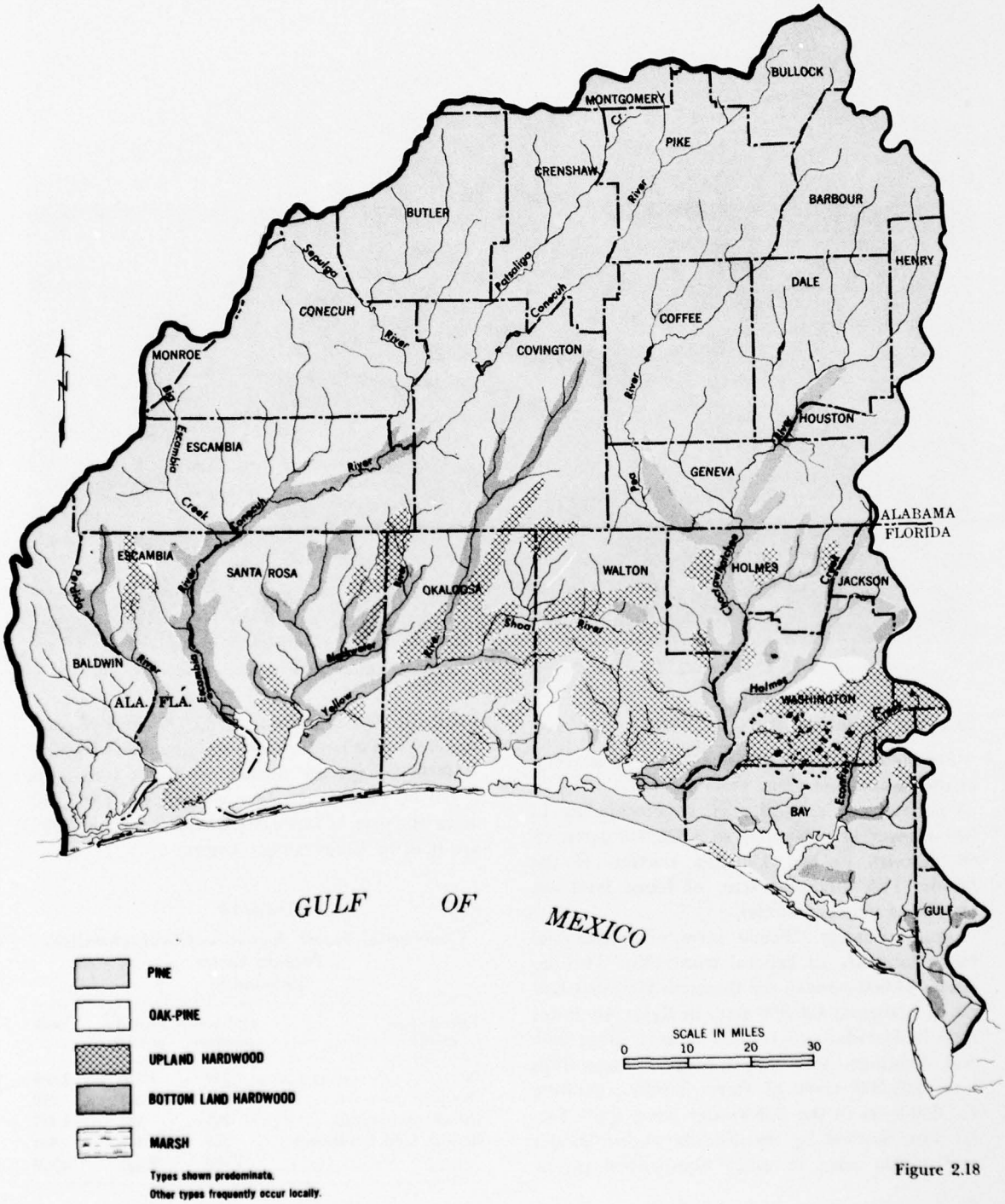
TABLE 2.6

Commercial Forest Acreage—Choctawhatchee-Perdido Basins (thousands)

Forest-type group	Alabama portion	Florida portion	Total
Pine	1,948	1,710	3,658
Oak-pine	261	228	489
Upland hardwoods	785	692	1,477
Bottom land hardwoods	528	467	995
Total	3,522	3,097	6,619

FORESTRY

1960



Types shown predominate.
Other types frequently occur locally.

Figure 2.18

Pine forests make up more than half of the commercial forest area, longleaf and slash pines being the principal species. Upland hardwoods, the second group in acreage, occupy nearly one-fourth of the forest land area and consist mostly of oaks and hickories. Bottom land hardwoods, the next group in importance, are normally confined to areas bordering major rivers and tributaries. Principal species in this group are black gum, cypress, ash, maple, and oaks. Oak-pine types, the fourth group in acreage, are scattered throughout the basins and contain mostly hardwoods of the sweet gum, hickory, and oak species mixed with occasional pine.

In terms of total merchantable growing stock, commercial forest land contains 1,773 million cubic feet of softwoods and 1,402 million cubic feet of hardwoods. Some 146 million cubic feet of growing stock were cut in 1959 for all products. Sawlogs were the major product harvested, followed closely by pulpwood. The remainder of the growing stock harvested was cut into miscellaneous logs and bolts, fuelwood, piling, posts, and ties. The stumpage value of the wood harvested in 1959 was about $14.6 million.

Less than 15 percent of the slash and longleaf pine trees of workable size is faced for gum-naval stores production. The stump supply for wood-naval stores is becoming scarce and this source will not be available to meet the future demand. Pulpmill byproduct production of naval stores has increased considerably in recent years, but existing mills are now approaching maximum output. New mills or additions to existing mills will allow some increase in total production of naval stores.

There are a number of active programs for improving forestry practices and yields in the basins. Alabama and Florida are accelerating their programs for management assistance, and more landowners are becoming interested in improving their woodland. In addition, other public agency technicians, industrial foresters, and consulting foresters are helping interested landowners improve their forest lands.

Both public and private organizations support research relating to forest problems and needs. These include the Agricultural Experiment Stations, the U. S. Forest Service, State forestry organizations, various State colleges and universities, the wood-using industries, and several foundations. Protection, management, utilization, and genetic studies all receive emphasis.

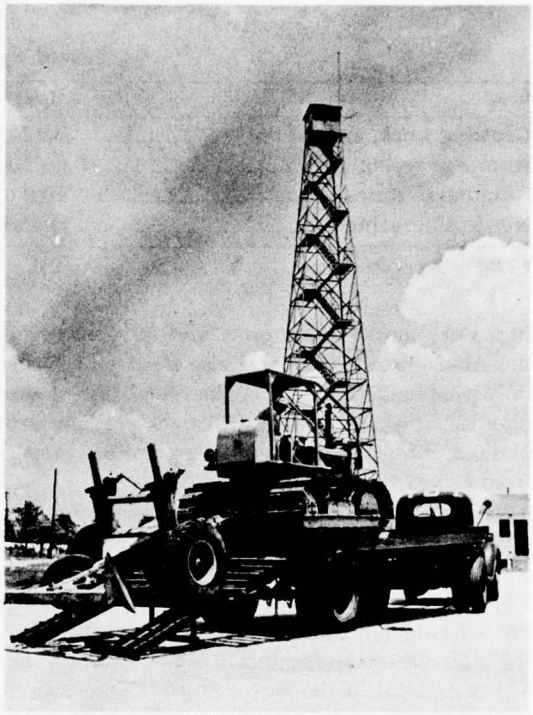


Figure 2.19 *Fire Tower and Modern Fire-Fighting Equipment Provide Forest Protection.*

Emphasis on educational activities is provided by the State forestry organizations through field personnel and by trained district and central office specialists.

All of the woodland in the basins is under organized fire protection. Most of the counties have been protected for more than 10 years. Alabama and Forida forestry organizations have been effective in reducing wildfire losses, but they are not fully staffed or equipped to sustain their record through critical fire periods. Some strengthening of protection on both public and private lands is needed to insure adequate protection.

The tree-planting program in both States is progressing rapidly. An average of more than 60,000 acres per year has been planted in the Florida portion of the basins during the past 5 years. The Alabama Forest Service distributed enough seedlings to plant some 65,000 acres in the Alabama portion of the basins during the 1959-60 planting season. The Florida plant-

TABLE 2.7

Annual Forestry Production

Item	Unit	1959	1975	2000
Growing stock, annual cut	cu. ft.	146,000,000	227,000,000	361,000,000
Stumpage value	dollar*	14,600,000	22,700,000	36,100,000
Gum-naval stores	face	815,000	1,120,000	1,630,000
Net leasing value	dollar*	163,000	224,000	326,000

* 1960 dollar equivalent.

ings were mostly slash pine, and 80 percent of the Alabama plantings was also slash pine. Loblolly pine made up most of the remainder of the planting stock. Normally, 800 trees per acre are planted; however, planting prescription ranges from 600 to 1,200 seedlings per acre.

The Naval Stores Conservation Program is administered by the U. S. Forest Service for the Agricultural Stabilization and Conservation Service. The Service provides conservation payments for carrying out approved forestry practices on the land. Of the 79 producers in the basins, some 54 are enlisted in the Naval Stores Conservation Program and work 568,000 of the 815,000 faces now treated for naval-stores production.

There have been no recent major epidemics of insects or diseases in the woodlands of the basins, although this is an ever-present danger. Field technicians of the States and Federal forest services help detect outbreaks and report them for appropriate action.

Needs and Opportunities

The productive capacity of the projected forest acreage, if reasonably managed, can produce the projected requirements for wood and gum-naval stores. It is estimated that, by the year 2000, approximately 361 million cubic feet of growing stock in the basins will be cut to provide the raw material for needed products.

Gum-naval stores will eventually replace wood-naval stores, and production will have to be doubled to maintain total present output of naval stores production. Enough slash pine and longleaf pine trees of a suitable size will be available for efficient production.

The woodland farm acreage is expected to decline, while nonfarm acreage is expected to increase. Overall effect will be a small decline in total acreage.

Means of Meeting the Needs

Improved practices and coordinated individual and community efforts will be essential if forestry production goals are to be met.

On Federal lands, forest management and protection programs could be accelerated by installation of facilities, road building, planting, and carrying out timber-stand improvement measures.

Measures needed for private lands could include: Intensifying forest-fire protection; strengthening forest insect and disease detection and control programs; building fences to control woodland grazing; tree planting; preparing sites for natural regeneration; commercial and noncommercial thinning; establishing shelterbelts; installing woodland water control and management; employing improved naval-stores practices; establishing more adequate programs for forest credit and insurance; and expanding educational, study, and management assistance programs.

SECTION VIII – FISH AND WILDLIFE

General

Fish and wildlife resources have contributed much toward meeting the needs for food, furs, and the hunting and fishing activities of people in the Choctawhatchee-Perdido basins. The relative importance of these uses has changed much since early colonial days when fish and pelts

Figure 2.20 *The Basins Provide Cover for Good Bird Hunting.*

were two of the leading commodities of trade. Commercial fishing along the coast still provides a livelihood to many people. Primary use of fish and wildlife resources throughout the basins, however, is for sport.

Existing Facilities and Programs

Wildlife and Sport Fisheries

The land and waters of the basins are well adapted to the production of a variety of fish and wildlife. About 7.7 million acres are suitable for big game. The habitat ranges from poor to excellent in quality. Nearly all the area that is predominantly forested and much of the woodland interspersed with cleared land are occupied by white-tailed deer and wild turkey. There are an estimated 70,000 big game animals in the basins or an average of one per 110 acres of suitable habitat.

Small game habitat totals about 8.9 million acres and consists of the forests, interspersed forests and cleared lands, and marshes. The principal upland game species are bobwhite quail, mourning doves, squirrels, and rabbits. Rails are the dominant game bird of the coastal marshes. There are an estimated 5.4 million small game animals in the basins averaging one per 1.6 acres.

There are 272,000 acres of waterfowl habitat in the basins of which 12,000 acres have a moderate to high waterfowl value. The 1960 midwinter inventory recorded 1,600 waterfowl, most of which were in Perdido Bay. Additional waterfowl utilize the inland lakes and swamps. The total population during the autumn migration is estimated at about 25,000. Wood ducks make

FISH AND WILDLIFE

1960

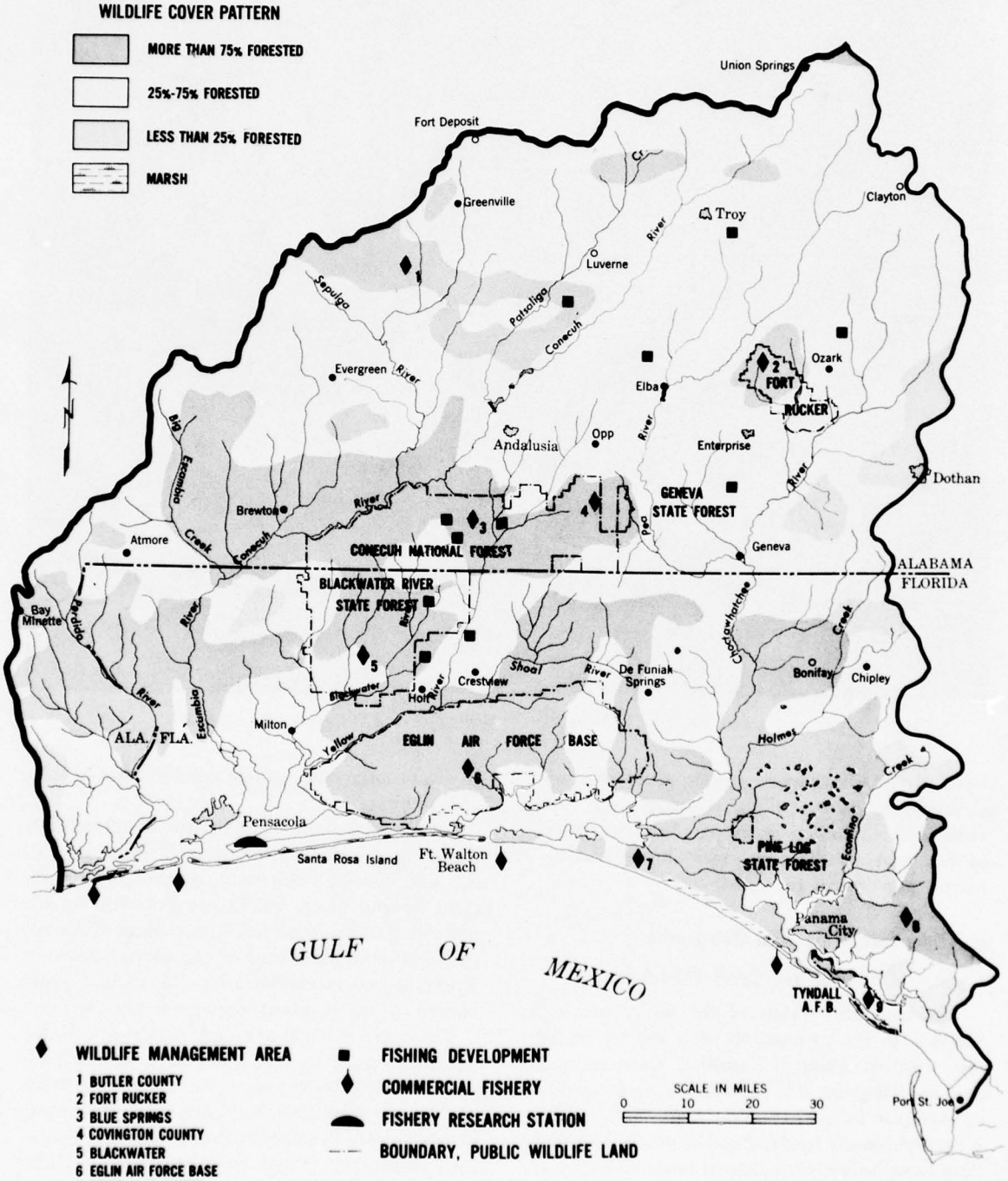


Figure 2.21

Figure 2.22 *Public Lakes Furnish Good Fishing Opportunity.*

up a large proportion of this number.

Many of the stream's upper reaches offer low quality fishing because of siltation, low fertility, and large numbers of nonsport fish. The Escambia River receives quantities of industrial waste. Excellent fishing is afforded in the lower reaches of some of the streams. Streams in the western part of the basins have gravelly bottoms, flow swiftly, and are cool and relatively shallow. Toward the east, they have more of the character of darkwater swamp drainage of spring-fed creeks.

There are a number of natural and artificial lakes of more than 40 acres in the basins. The largest concentration of natural lakes is the Deadening Lakes region of Washington County, Florida. Alabama has no natural large impoundments but the Alabama Department of Conservation has constructed five county public lakes which are listed at the end of Table 2.8. Similarly, two public lakes for fishing, Bear and Silver Lakes, have been constructed in Florida by the Florida Game and Fresh Water Fish Commission. Lake Gantt, the largest water body in the Alabama portion of the basins, has a surface area of 1,600 acres. It was constructed for hydroelec-

tric power purposes. North Bay near Panama City, Florida, has been impounded as of 1962 to create a 5,000-acre lake.

Farm ponds and natural ponds of less than 40 acres comprise an important segment of fishing waters in the basins. Many of the natural ponds have fluctuating water levels, especially during drought years, which affect their utility for fishing. Farm ponds offer fishing of a variable quality, depending on the management practices of the owners.

Principal fresh-water sport fishes taken in the basins include bream, largemouth bass, spotted bass, rock bass, striped bass, pickerels, Alabama shad, and various catfish. Salt-water fish may be taken in the lower reaches of the streams.

The surface area of inshore waters, including the zone of salt-water influence in the major streams, totals about 322,000 acres. Arbitrarily extending the basins boundaries seaward to the recognized limit of nearly all fishing activity incorporates an offshore area of over 2 million acres.

Principal salt-water fish taken inshore include speckled sea trout, mullet, redfish, white sea trout, sheepshead, grouper, whiting, flounder, pompano, and several lesser bottomfish. Offshore, the principal species include sea bass, Spanish and king mackerel, grouper, bluefish, and jack crevalle.

The southeastern area of Washington County, Florida, contains fish and wildlife habitat worthy of special consideration. Remote from urbanized areas and sparsely populated, it consists of 45,000 acres of low, rolling sand hills interspersed with about 50 lakes. The lakes range from 5 acres to 1,000 acres in size and were formed by the action of water, particularly underground streams, on the underlying limestone. Pine and scrub oak cover the hillsides. Principal game fishes are warmouth and largemouth black bass; principal wildlife species in the surrounding forest are

TABLE 2.8

Fish and Wildlife Areas and Installations

Unit	Administering agency	Acreage
Federal		
Conecuh National Forest	U. S. Department of Agriculture	84,000
Fort Rucker	U. S. Army	53,000
Eglin Air Force Base	U. S. Air Force	426,000
Tyndall Air Force Base	U. S. Air Force	21,000
State and private		
Blue Springs Wildlife Management Area	Alabama Department of Conservation	[1]25,000
Covington County Wildlife Management Area	Alabama Department of Conservation	35,000
Butler County Wildlife Management Area	Alabama Department of Conservation	24,000
Geneva State Forest	Alabama Department of Conservation	7,000
Blackwater River State Forest	Florida Forestry Commission	181,000
Pine Log State Forest	Florida Forestry Commission	7,000
Roy S. Gaskin Wildlife Management Area	Florida Game and Fresh Water Fish Commission	90,000
Blackwater Wildlife Management Area	Florida Game and Fresh Water Fish Commission	[2]85,000
Point Washington Wildlife Management Area	Florida Game and Fresh Water Fish Commission	106,000
Holt Fish Hatchery	Florida Game and Fresh Water Fish Commission	34
Silver Lake	Florida Game and Fresh Water Fish Commission	85
Bear Lake	Florida Game and Fresh Water Fish Commission	107
Coffee County Public Lake	Alabama Department of Conservation	80
Crenshaw County Public Lake	Alabama Department of Conservation	53
Pike County Public Lake	Alabama Department of Conservation	45
Geneva County Public Lake	Alabama Department of Conservation	65
Dale County Public Lake	Alabama Department of Conservation	92
Open, Buck, and Ditch ponds	Alabama Department of Conservation	[1]40
Public access (15)	Alabama Department of Conservation and Florida Game and Fresh Water Fish Commission	

NOTES: [1] Contained within Conecuh National Forest.
[2] Contained within Blackwater River State Forest.

Figure 2.23 *Large Attendance on Opening Day at Geneva County Public Lake, Alabama.*

white-tailed deer, wild turkey, bobwhite quail, and a variety of nongame birds and mammals which enhance the unusual qualities of this area.

Wildlife and fish management in the basins has been directed primarily toward increasing the hunting and fishing opportunity, preservation of unique forms of wildlife and wildlife habitat, and development of the commercial fishing industry.

Primary responsibility for administering the fish and wildlife resources resides with the State game and fish departments of Florida and Alabama. Federal agencies cooperating with the State conservation agencies to advance conservation programs include agencies within the Departments of Interior, Agriculture, and Defense.

Public managed wildlife areas of major importance contain about 1 million acres of wildlife habitat. Eglin Air Force Base is the largest single tract of land in which wildlife resources are managed for public use. The next largest areas are Blackwater River State Forest in Florida and Conecuh National Forest in Alabama. The Florida Game and Fresh Water Fish Commission owns and administers two public fishing lakes; the Alabama Department of Conservation owns and assists in the management of five public fishing lakes. Game fish for stocking purposes are produced in three State hatcheries; two located in Alabama, outside of the basins, and one in Okaloosa County, Florida.

Public hunts are carried on in the State wildlife management areas. Both Alabama and Florida have farm-game programs which encourage and aid farmers in managing wildlife resources on their lands.

Fishery management has been concerned largely with technical advice and renovation and restocking of natural lakes and farm ponds. Florida and Alabama have active programs of public access development. Law enforcement and information-education programs are important facets of State and Federal activity.

Several large privately owned plantations have been developed as hunting preserves and are especially important to wildlife. Land-use practices on these plantations are designed to improve the habitat for bobwhite quail, wild turkeys, deer, and mourning doves.

Commercial Fisheries

Commercial fishing is an important coastal

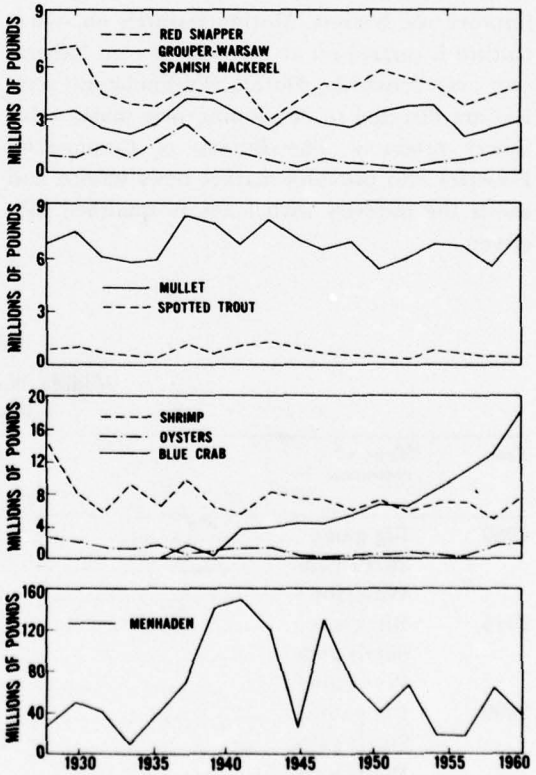


Figure 2.24 *Commercial Fish Catch — Gulf Coast — Southeast River Basins.*

enterprise. The annual catch between 1955 and 1959 averaged 11.3 million pounds, and was worth $1.8 million to the fishermen. Industrial and bait fish constituted less than 2 percent of the total catch by weight and value. Red snapper, shrimp, grouper, mullet, and Spanish mackerel were the principal food fish landed at ports in the basins. Other food fish landed included speckled trout, pompano, flounder, bluefish, crabs, oysters, and scallops. While some of the catch is consumed locally, much of it is processed and marketed throughout the eastern United States. Oyster production is small at the present time.

The salt-water fisheries are administered cooperatively by the Florida State Board of Conservation, the Alabama Department of Conservation, and the U. S. Bureau of Commercial Fisheries. There are numerous programs for research, development, and service in the region. The U. S. Bureau of Commercial Fisheries has an active exploratory fishing program in the Gulf of Mexico and is testing new kinds of gear to improve the harvest. Marine research on oyster culture is carried on at the Gulf Breeze Laboratory near Pensacola, Florida. Technological services are directed to developing new markets for fishery products. The Bureau of Commercial Fisheries also provides market news service and assists the industry with loans to qualified fishermen.

Needs and Opportunities

Wildlife and Sport Fisheries

In 1960, hunting and fishing afforded nearly 3 million user-days of outdoor activity. The value to the sportsmen is estimated to be $7.6 million based on user-day values ranging from $.50 to $5.00. By 2000, the user-days of hunting and fishing demand are expected to increase to about 11 million.

The total population increase and trend toward urbanization are considered to be decisive factors in projecting hunting and fishing requirements. The per capita demand for hunting and fishing decreases as urbanization increases.

Use of publicly owned and managed areas will continue to increase at a rate greater than the general increase in population and overall hunting and fishing effort. This, too, reflects the impact of urbanization. Closure of more private lands to public use could make it increasingly difficult for the urbanite to find a place to fish and hunt, despite increases in travel, leisure time, and personal income.

An analysis of the needs for hunting opportunity in relation to resource trends and development opportunities indicates greater emphasis on big game hunting in the future. With normal expansion of going programs there will be sufficient numbers of white-tailed deer in the basins to satisfy a much greater percentage of the total hunting effort than at present. Small game re-

TABLE 2.9

Wildlife Needs and Supply (thousands)

Year	Type of resource	Needs	Supply		Deficit
		User-days	Acres of habitat	User-days capacity*	User-days
1960	Big game	145	7,746	350	0
	Small game	475	8,933	906	0
	Waterfowl	40	272	8	32
1975	Big game	256	7,746	1,025	0
	Small game	757	8,847	906	0
	Waterfowl	44	272	8	36
2000	Big game	711	7,746	1,050	0
	Small game	1,010	8,542	906	104
	Waterfowl	76	272	8	68

* Based on existing and prospective number of game with normal expansion and acceleration of going programs.

TABLE 2.10

Sport Fishing Needs and Supply
(thousands)

Year	Type of resource	Needs	Supply		Deficit
		User-days	Acres of habitat	User-days capacity[1]	User-days
1960	Streams	242	15	194	48
	Large impoundments	657	[2]17	234	423
	Small impoundments	566	12	409	157
	Salt water	1,531	2,420	9,348	0
1975	Streams	263	15	194	69
	Large impoundments	1,170	23	316	854
	Small impoundments	947	19	628	319
	Salt water	2,560	2,420	9,348	0
2000	Streams	263	15	194	69
	Large impoundments	2,095	23	316	1,779
	Small impoundments	1,744	35	1,157	587
	Salt water	5,124	2,420	9,348	0

NOTES: [1] Based on existing and prospective fish populations with normal expansion of going programs.
[2] Exclusive of North Bay impoundment.

sources are expected to continue to support the majority of the hunting effort although the supply and availability of small game, particularly bobwhite quail and mourning doves, will become critical. Waterfowl resources are inadequate to meet present needs and prospects for increasing the supply of birds are not encouraging. Established goals, which provide for an increase in waterfowl hunting effort, are contingent upon the development of effective practices for increasing the resident population of ducks and geese and on controlled shooting preserves where ducks are produced domestically.

An analysis of the needs and desires for sport fishing in relation to resource trends and development opportunities led to the establishment of goals which place much greater emphasis on salt-water fishing.

Streams, large impoundments, and small impoundments, which are inadequate to meet present needs, would afford far less than the required user-day capacity by 2000. These resources can be improved and their user-day capacity greatly increased by intensive management. A greater percentage of the fishing effort, however, would have to be directed toward salt-water fishing and to other fresh waters outside the basins.

Commercial Fisheries

The demand for food fish landed at ports in the basins is expected to increase to about 23.9 million pounds by 2000 or about 2.1 times the current catch. This reflects the projected increase in national population, and a constant rate of per capita consumption equivalent to the national average of 11 pounds, edible weight. Future requirements by kind of fishing resource were distributed on the basis of trends in supply, availability, costs of production, and other factors.

The shrimp fishery was expanded in the early 1940's in response to increased demand, coupled with improved techniques of processing and marketing. With full utilization of known supplies, however, further expansion of this industry was limited.

Oyster production, which reached its zenith in the early 1900's when there was an abundance of oysters and a demand for canned products, declined to a low in 1960. The demand for quality seafood, however, is high and is expected to be increasing. To meet this demand, it is feasible to augment natural production of shrimp, oysters, and certain finfishes by cultural programs. As for other fishes, there seems to be ample supplies and a potential market if food

products can be produced that will meet with wide public acceptance.

TABLE 2.11

Commercial Catch Requirements (thousands of pounds)

Resource	1960*	1975	2000
For food			
Finfishes	10,364	11,510	15,057
Crabs	12	850	3,500
Oysters	9	125	325
Scallops	8	10	16
Shrimp	757	775	832
Others	0	1,300	3,830
Subtotal	11,150	14,570	23,560
For other purposes	150	200	320
Total	11,300	14,770	23,880

* Based on average annual catch 1955-59.

Means of Meeting the Needs

An analysis of the fish and wildlife potentials revealed that, with more intensive management and increased availability of fish and wildlife resources, the projected demand for food, hunting, salt-water sport fishing and commercial fishing can be met.

Wildlife and Sport Fisheries

Big game development affords one of the most promising ways to meet the future demand for hunting. With more intensive management, the habitat can readily supply the expected big game demand, plus a considerable amount of unsatisfied demand for small game and waterfowl hunting. The general land-use trend indicates some loss of habitat can be expected for big game because of urban and industrial development and because of the overall decrease in forest land. Current forestry practices involving destruction of hardwoods, planting of solid pine stands, and draining and clearing of mixed forest land tend to reduce the carrying capacity of habitat considerably.

To meet the demand for big game hunting, an inventory of 142,000 head by 2000 would be adequate. About 210,000 head of big game are expected to be in the basins by that time. However, the supply will be inadequate in Florida where most of the demand occurs. Therefore, the existing big game program in Florida will have to be accelerated. Additional wildlife areas will be needed in Alabama and in Florida to insure access to the public to hunt the increasing number of big game animals.

The existing areas and proposed areas would be improved by the State game and fish departments in cooperation with the landowners, generally in accordance with the type of programs now in effect. The coordinated approach to timber-wildlife management as practiced in the Conecuh National Forest needs to be applied on a much larger scale. Continued improvement of wildlife habitat and provision for public use of military areas should be encouraged.

The task of developing small game resources to meet the demand lies primarily with the landowners, particularly the agricultural landowners. Bobwhite quail and mourning doves are largely the product of the type and pattern of land use. Employment of agricultural practices which provide food and cover for wildlife should be encouraged. These include prescribed burning, roadside planting, and establishment of food and cover strips.

Meeting the demand for waterfowl hunting is not a problem which can be effectively resolved by more intensive management within the basins although this would be of some value. The problem of waterfowl supply has its roots far from the borders of the basins. After remaining essentially static for several years, the duck population trend in the Atlantic and Mississippi Flyways has resumed a gradual decline. However, the waterfowl value of the basins wetlands should be enhanced by a program oriented toward improving the habitat in conjunction with all major water development projects and the farm pond program.

The coastal marshes, confined for the most part to the large bays, have waterfowl potentials which could be realized by a program designed to replace the juncus and cordgrass with more desired regulation of water depth and salinity.

Establishing regulated shooting preserves by local interests for small game and waterfowl hunting is desirable because this sport affords reasonably satisfactory hunting and is not entirely dependent upon resident game supplies.

A balanced program of stream and lake improvement and development is needed to meet

present and future needs of fresh-water sport fishing. If the present trend in farm pond construction continues, the number and acreage of farm ponds to meet the demand for farm pond fishing are expected to be ample. The current fisheries program, however, would have to be expanded to service the ponds and other impoundments and to increase the average production of fish per acre and the quality of fishing afforded.

There is a noted lack of large fresh-water impoundments in the basins particularly in the middle and upper areas. Field surveys have revealed numerous sites where large reservoirs could be located to help satisfy the need for sport fishing in multiple-purpose development. A minimum of 177,000 additional acres of large impoundments, managed at the present level, would be required to produce the weight of fish necessary to satisfy the anticipated fishing pressure. An alternative program would be 23,000 additional acres of medium to large impoundments managed at a high level. The development of impoundments within the coastal marshes and the conversion of saline waters to brackish waters by water control works offer additional opportunities to meet these needs.

The supply and availability of sport fish in the streams are also expected to be inadequate. New streams cannot be created to satisfy increasing demands for fishing as readily as can impoundments. Therefore, management to meet the demand for stream fishing depends largely upon improvement of existing habitat and development of facilities and public access to the streams. Minimum facilities at most sites should include a concrete boat-launching ramp and parking area. Camping facilities at a number of the sites would further increase their utility.

Realization of the full potentials of the streams would require flow regulation to increase their productivity and extend the period when conditions are favorable for sport fishing. Flow regulation would also provide needed stream fluctuation for best fish production and harvest. Regulated streamflow, adequate sewage treatment, and proper disposal of industrial wastes, would also reduce pollution problems and enhance the stream values.

Meeting the need for projected user-days of salt-water fishing would require further development of facilities, services, and accommodations. The marine waters are capable of producing more than the amount of fish needed to meet the projected requirements.

While facilities for salt-water sport fishing are highly developed in the bays near Pensacola, Fort Walton Beach, and Panama City, there is opportunity for further expansion at these and other points along the coast. More fishing piers would be needed with a total capacity of at least 1 million user-days annually. Additional access is needed to offshore and inshore waters to reduce the travel time to popular fishing grounds and to reduce congestion at existing access sites during the height of the fishing season. Long stretches of sea coast have no public access areas and, as a consequence, are lightly utilized by surf or boat fishermen. Bridges across bays and inlets, if equipped with catwalks in accordance with present trends in bridge construction in Florida, would provide convenient and readily available fishing opportunities. Jetties and breakwater structures, both popular fishing places, could serve a greater segment of the fishing public if equipped with walkways and handrails.

For maximum benefits, navigation and other water developments should be designed to safeguard and possibly enhance the productivity of the coastal waters. There is a need to disseminate more information about fishing areas, so that the fishing effort would become widespread.

Artificial fishing reefs, 3 to 4 feet high, in water with depths varying from 20 to 60 feet, would serve to localize marine fish populations. If appropriately marked, they could be located easily by sport fishermen. Such a program is rapidly gaining momentum and affords one of the best and least expensive ways to improve the catch in the open sea.

Preservation and development of the Deadening Lakes area in Washington County, Florida, for fish and wildlife purposes would necessitate public action. Greater utilization of the natural resources could be encouraged without impairment of the unusual wilderness qualities. Public acquisition and administration of the lands and waters within the general area would be preferable to insure orderly development.

Commercial Fisheries

The catch of finfish could be expanded to

meet established goals. Methods for handling and processing species such as mullet and speckled trout must first be improved, however, to create quality products that will compete with seafoods from other areas. With improved gear and fishing methods, the yield per unit of effort can be increased and the operations expanded at reasonable cost.

The shallow inshore waters of the basins afford great potentials for seafood culture. Despite the productivity of the sea, it will become increasingly difficult to harvest the wild crop at costs which will permit the industry to compete with foreign sales and the mass production and marketing methods of the meat and poultry industries. Results thus far achieved through experimental pond culture of shrimp and pompano provide sufficient basis for the initiation of experimental management programs. Extensive application of proven practices can be expected after practical demonstrations of this technology. Oyster reef rehabilitation and expansion can effectively increase oyster production, if adequate measures are taken to prevent pollution in the reef areas.

SECTION IX – RECREATION

General

The major recreation resource of the Choctawhatchee-Perdido basins is the shoreline that extends from the Baldwin County beaches in Alabama easterly to Port St. Joe, Florida.

Perdido Bay, Pensacola Bay, Choctawhatchee Bay, and St. Andrew Bay, with their large protected water areas, offer attractive sites for a great variety of recreation activities. This extensive coastal area with its flourishing cities, resort areas and facilities is undergoing the same rapid changes as other coastal areas in the United States. These changes include population increases, commercial development, increased land values, and concentrations of activities. New roads and bridges are opening many reaches of beach to private development.

The Upper Coastal Plain of the basins does not have many attractive natural features which form centers for recreation. Consequently, recreation opportunities are lacking. Nevertheless, the area has innumerable land and water resources which can be adapted to meet recreation needs by supplying facilities for large numbers of people. Recreation needs and opportunities are focused upon utilizing natural resources where they are available. Such resources include the Gulf coast and the land and water resources in the inland areas.

Existing Facilities and Programs

In 1959, visitation at public recreation areas within the basins totaled about 4,500,000 user-days. The existing facilities could support 6,050,000 user-days in 1960. The greatest use is made of the coastal beaches. Inland recreation is severely handicapped by limited facilities.

High-density recreation areas include beaches and State parks along and adjacent to the Gulf of Mexico from Baldwin County, Alabama, to Gulf County, Florida. Gulf State Park in Baldwin County, Alabama, with about 5,700 acres, has facilities for camping, swimming, boating, and picnicking. Gulf State Park's excellent beach averages about 500,000 visitors annually. Fort Pickens State Park, near Pensacola, Florida, and St. Andrew State Park, near Panama City, Florida, with their excellent beaches, have facilities for swimming and camping. John C. Beasley State Park is a 23-acre unit at Fort Walton, Florida, with facilities for swimming. The remainder of the Gulf coast beaches permitting public recreation includes stretches of beach east of Pensacola, Florida. Some of these are Pensacola Beach, Santa Rosa Island, Fort Walton Beach, Walton and Bay County Beaches, and the beaches of Gulf County within the basins. About 15 percent of the sand beaches are set aside for defense or navigation purposes and, therefore, have limited public recreation use. The beach and park areas supported over 4 million user-days of recreation in 1959.

A general recreation area is Gantt Reservoir, a 1,600-acre impoundment north of Andalusia in Covington County, Alabama. The reservoir was

RECREATION

1960

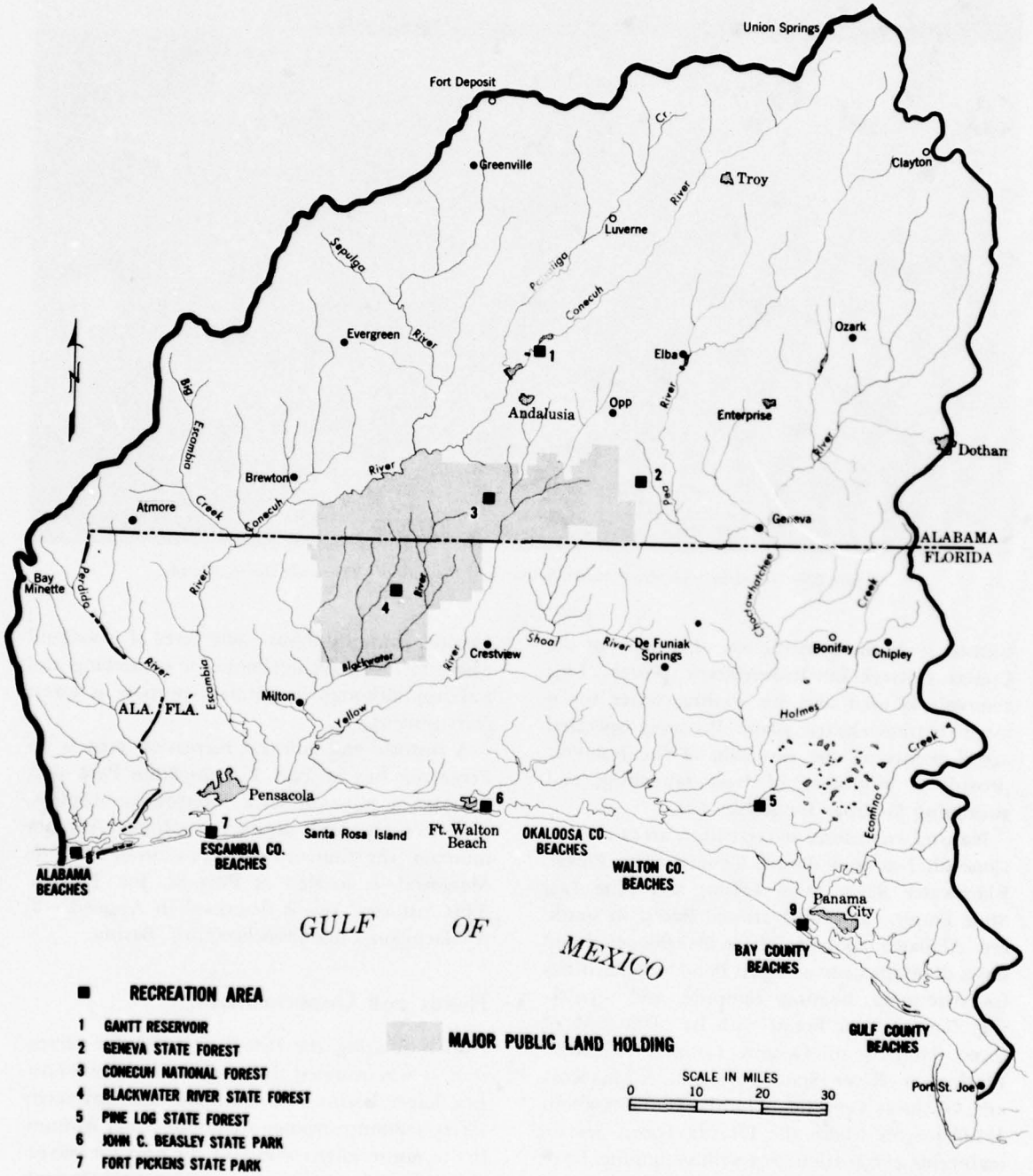


Figure 2.25

Figure 2.26 *Good Beaches Are a Major Resource of the Basins — Pensacola Beach, Florida.*

formed from the construction of a dam on the Conecuh River for hydroelectric power. This reservoir is used also for cooling water for a large thermal electric plant. Privately operated access points on the east side of the reservoir provide a minimum of boat launching and swimming facilities for public use.

Natural environment recreation areas are the Conecuh National Forest, Geneva State Forest, Blackwater River State Forest, and Pine Log State Forest. Conecuh National Forest in southern Alabama contains about 84,000 acres and has a developed site at Open Pond with facilities for swimming, boating, camping, and picnicking. Geneva State Forest with its 7,000 acres of forest land is in Geneva County, Alabama. Blackwater River State Forest in Santa Rosa and Okaloosa Counties, Florida, contains about 181,000 acres where the Florida Forest Service maintains a recreation area with swimming, boatting, and picnicking facilities, and a concession building. Pine Log State Forest in Bay County, Florida, contains about 7,000 acres of woodland where facilities are available for picnicking and walking, although its primary purpose is forest management.

A historic and cultural recreation area is on Pensacola Bay at Fort Pickens State Park that contains a museum with interpretive displays, a concession, and sanitary facilities. Another museum, the Constitution Convention Historic Memorial, is located at Port St. Joe, Florida. This historical site is described in Appendix 7, Apalachicola-Chattahoochee-Flint Basins.

Needs and Opportunities

In estimating the future demand for recreation, it was assumed that residents in the Southeast River Basins who leave the area primarily for recreation purposes are about equal in number to nonresidents who visit the area for recreation. However, many recreationists pass through the basins, and about 60 percent of these seek

Figure 2.27 *Water Skiing Is an Increasingly Popular Sport.*

some type of outdoor recreation. The basins have excellent land and water resources for attracting recreation-seeking people. Many of the residents of future years will be persons who moved into the area because of climate and available land and water recreational facilities.

TABLE 2.12

Recreation User-Days—1960, 1975, and 2000 (thousands)

Area	1960	Projected need	
		1975	2000
Choctawhatchee-Perdido basins	6,050	15,910	46,000
Southeast River Basins	35,000	95,000	230,000

Urban population is expected to be over 60 percent of the basins population by the year 2000. Residents are expected to need about 35 million user-days of outdoor recreation by 2000. An additional 11 million user-days are expected to be needed by tourists and other people coming into the basins for recreation from such cities as Montgomery, Birmingham, and Mobile, Alabama. Demand will occur mainly in the summer months. Although spring and fall are comfortable for outdoor recreation, the winter weather is not as conducive to most outdoor recreational activities.

Blackwater River, Geneva, and Pine Log State Forests, Conecuh National Forest, Gantt Reservoir, and five county fishing lakes in Alabama could supply additional opportunities. The coastal beaches could have facilities for almost 12 million user-days in 1975 and nearly 33 million days by 2000. The existing inland areas could have facilities for 750,000 user-days in 1975 and 2,100,000 user-days by 2000. Facilities for intensive recreation use should be developed. Several areas still undeveloped could be purchased so as to retain them for the public. Continual development to the year 2000 could assure facilities to meet the growing needs.

TABLE 2.13

Recreation Facility Needs (thousands of user-days)

Facilities	1960	Increase to 1975	Increase 1975-2000	2000
Enlarging existing areas	6,050	6,415	22,595	35,060
New areas	---	3,445	7,495	10,940
Total	6,050	9,860	30,090	46,000

Means of Meeting the Needs

General recreation areas, such as access areas, parks, and impoundments could be developed to help meet recreation needs. Developments could include areas adaptable to a wide variety of uses which could sustain a considerable amount of activity in camping, picnicking, boating, and cultural pursuits.

Natural environment recreation areas such as Morrison Springs, Falling Waters, and the Deadening Lakes area could provide recreation along with other resource uses. These areas could have areas within them adapted to both high-density use and general recreation use. The extensive water surface and woodland areas could give opportunities to the recreationists who like boating, hiking, and camping.

Historic and cultural areas could provide opportunities for students of nature and history, and for the sightseer. Several archeological sites are possibilities for development including Fort Walton Temple Mound in Okaloosa County, Florida, Bear Point in Baldwin County, Alabama, and Mitchell Site in Covington County, Alabama. Historic developments could include Fort San Carlos, Fort Barrancas, and Fort Redoubt on Pensacola Bay.

SECTION X – SALINITY AND SEDIMENT CONTROL

General

Salinity and sedimentation problems in the basins are localized. Salinity problems occur when enough salt accumulates in the soil to impair crop productivity or when salt water intrudes into fresh-water areas and interferes with water use. Sediment problems result when water

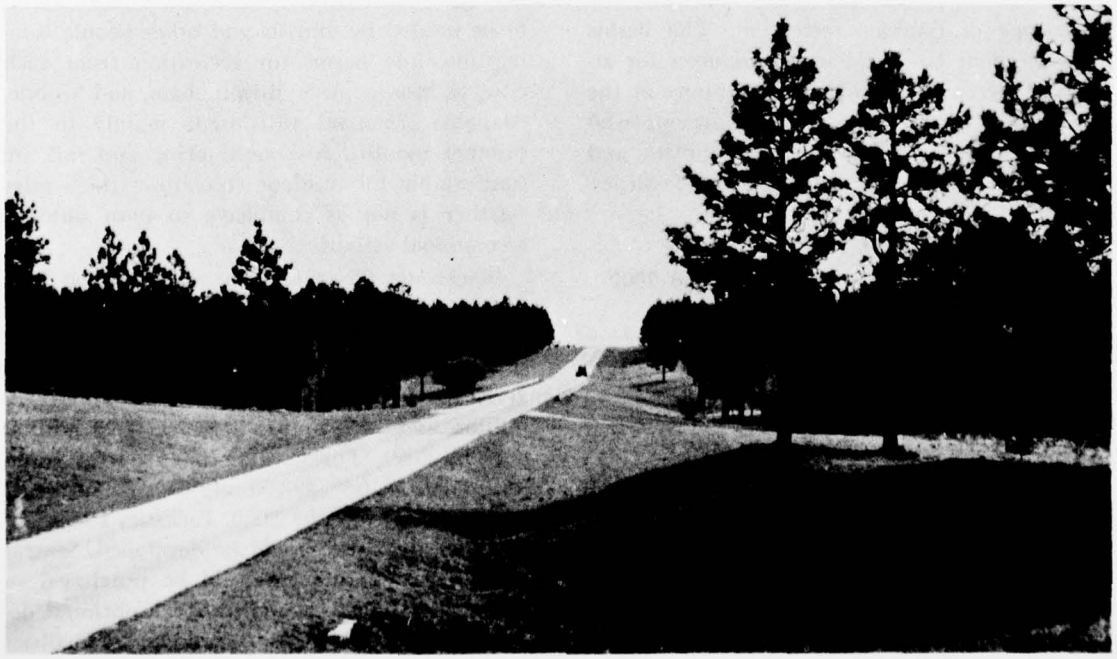


Figure 2.28 *Erosion Control and Beautification Are Involved in Highway Planning.*

SEDIMENT

1960

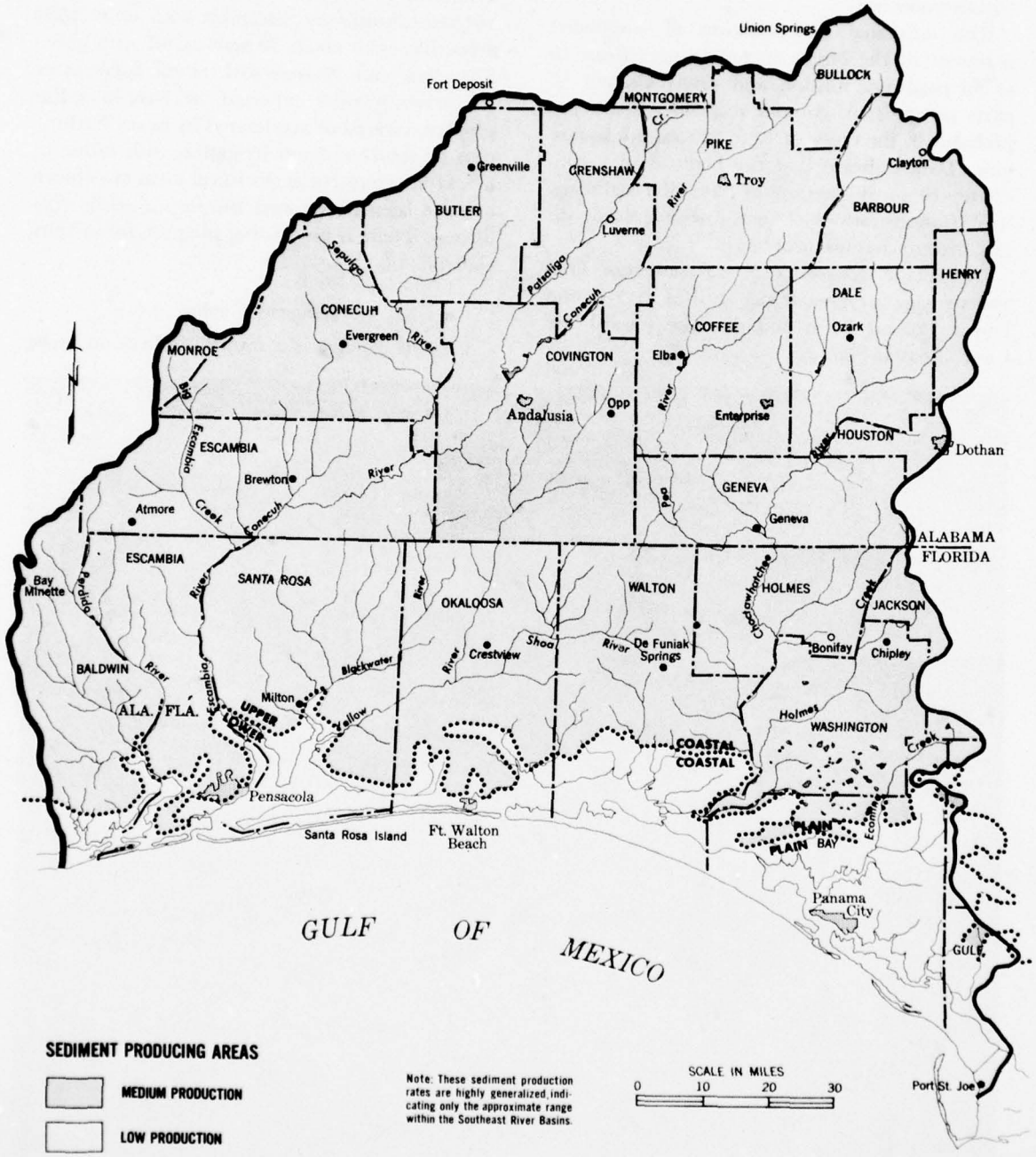


Figure 2.29

transports and deposits silt, sand, and earth materials in reservoirs, ditches, and channels, and on areas where these materials are not wanted or where these materials in the water curtail water use.

The estimated concentration of suspended sediment in the larger streams ranges from 10 to 30 parts per million and rarely exceeds 50 parts per million. Annual suspended loads are probably in the range of 10 to 30 tons per square mile. Data indicate that the bedload may constitute 10 to 50 percent of the total sediment load. Concentrations of such low magnitude do not present serious problems.

In general, erosion and thus sediment load and damage are greater per unit of area in the Upper Coastal Plain and decrease toward the Lower Coastal Plain.

Existing Facilities and Programs

Salinity Control

Saline soils occur in four Florida counties on a total of about 5,000 acres in the basins. The affected counties are: Escambia with about 1,250 acres, Bay with about 30 acres, Gulf with about 370 acres, and Walton with about 3,350 acres. No acreages were reported to have a saline problem created or accelerated by heavy fertilization or resulting from irrigation with saline or brackish waters. No agricultural areas are known to have been abandoned because of saline conditions. There is no existing program for salinity control.

Sediment Control

Erosion damage is a severe problem on more

Figure 2.30 *Salt Marsh Frequently Provides Good Pasture.*

Figure 2.31 *Crown Vetch and Rye Grasses Are Possible Covers for Stabilizing Highway Slopes.*

than 400,000 acres of land. There is no existing program exclusively for sediment control. The soil and water conservation program, which is administered by the soil conservation districts with technical assistance from the Soil Conservation Service, includes sediment control features. The Brackins Mill Creek Watershed project in Dale and Coffee Counties, Alabama, is the closest approach to a plan involving only sediment control thus far initiated in the basins area. This project is representative of the Red Hills area in the north central portion of the basins in Alabama and has as its primary objective the control of intense erosion to reduce the amount of sediment produced.

Needs and Opportunities

Salinity Control

Salt-water intrusion of ground water supplies is a problem near Pensacola and is of concern to Fort Walton and Panama City. Specific studies of this intrusion are being made by the U. S. Geological Survey.

Sediment Control

Group action may be needed on about 256,000 acres, involving more than 5,000 farms, where erosion damage is a problem on more than 400,000 acres of land. These acreages occur mostly in the upland areas of the Red Hills where intensive cultivation has resulted in accelerated erosion. Erosion control achieved through the application of soil and forest conservation practices will correct a large part of the sediment problems of the basins.

The acreages estimated to require land treatment measures by the years 1975 and 2000 are given in Section VI, Soil Conservation and Utilization. Although these measures are not specific-

ally for sediment control, one effect could be to reduce sediment production.

Roadside erosion problems occur along 8,400 miles of roadside. The problems are predominantly along unsurfaced county-maintained roads. Stabilization of these eroding areas would reduce sediment delivery. Treatment and stabilization of roadside areas could result in reduction of maintenance costs. Treatment measures could be as much as 90 percent effective in reducing rates of soil loss.

Outwash from areas of strip mining contributes to the sedimentation load and, although this is now a local problem, indications are that this activity may increase in the future. Strip mining is taking place in a narrow band in Alabama between Greenville and the eastern boundary of the basins.

Means of Meeting the Needs

Salinity Control

The need for agricultural land is not expected to necessitate reclaiming or rehabilitating any major portion of the saline soils in the basins for agricultural use until well after the year 2000.

If extensive demands continue to be made on the ground water aquifer near the Gulf, salt-water intrusion studies should be made for the entire Gulf coast in addition to those for Pensacola.

Sediment Control

Studies indicate that a sediment control program is needed in the basins and that any sediment control measures could be planned in conjunction with other objectives. Further studies could be made to: (1) Determine what effects strip mining has in contaminating livestock water when tailings are deposited on pastures; (2) determine whether sediment from mine operations has affected the fish production and recreation use of streams and reservoirs in the basins; (3) obtain information to correlate physical watershed factors with the proportion of eroded material that becomes sediment at specific downstream points; (4) determine the

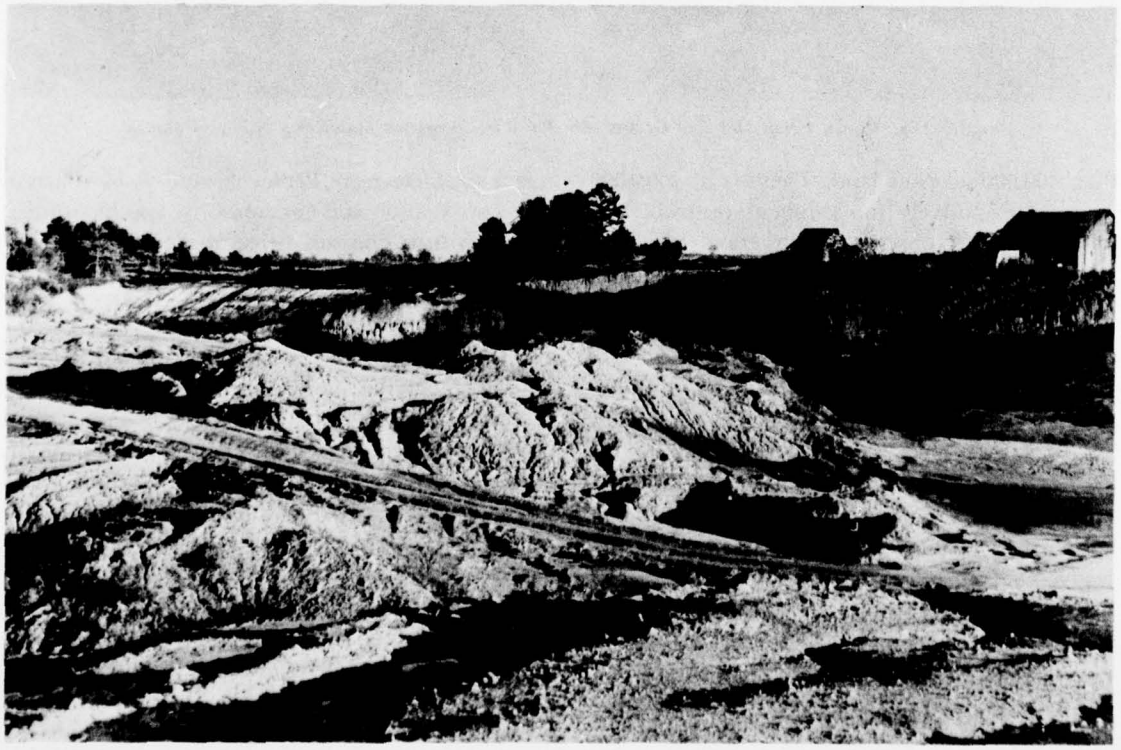


Figure 2.32 *Strip Mining for Iron Ore Contributes to Erosion and Sediment Problems.*

factors affecting rates and distribution and ultimate volume of sediment in reservoirs; and (5) determine factors affecting sediment gradient development upstream from structures and scour downstream from structures. Legislation to control strip mining, as has been enacted in several states, could reduce sediment loads from that source.

Measures for sediment control along the highways and at other earthmoving construction sites can be installed effectively as parts of overall watershed treatment and construction programs.

Farmland conservation practices and tree-seedling plantings could reduce erosion and sediment loads. Individual land owners and operators could apply measures for conserving, utilizing, and improving various types of land uses in the basins. These measures include vegetative stabilization, management practices, and grade-stabilization structures. Additional structures such as small debris basins could trap large amounts of silt.

SECTION XI – POLLUTION ABATEMENT AND PUBLIC HEALTH

General

Only those phases of public health programs directly related to land and water resources development are included in this study. Items discussed in this Section include: Pollution abatement, air pollution and radiation monitoring, the collection and disposal of community and industrial solid wastes, and vector control. The development and protection of potable water supplies as discussed in Section II is also an important part of the public health program.

The basic objective of all phases of the public health program is the protection of communities health through the control of man's environment. Establishing an adequate coordinated public health program is essential to the full development of the land and water resources of the basins.

Existing Facilities and Programs

Pollution Abatement

In 1960, the coastal waters of the basins were relatively free from pollution, except in the vicinity of Panama City and Pensacola, Florida, where municipalities and industries are concentrated. Some of the meandering arms of the bays and estuaries had localized pollution caused by sewage discharges from camps and small housing developments.

Pollution was also reported in streams below sewer outfalls of Atmore, Brewton, Brundidge, Greenville, Elba, Evergreen, Florala, Georgiana, Hartford, Luverne, Samson, and Slocomb in Alabama and Bonifay, Crestview, and Graceville in Florida. In 1960, however, these conditions did not persist for any appreciable distance downstream.

North Bay and Pensacola Bay were dark and turbid near the sewer outlets of Lynn Haven and Pensacola. St. Joseph Bay water was colored and turbid near sewer outfalls.

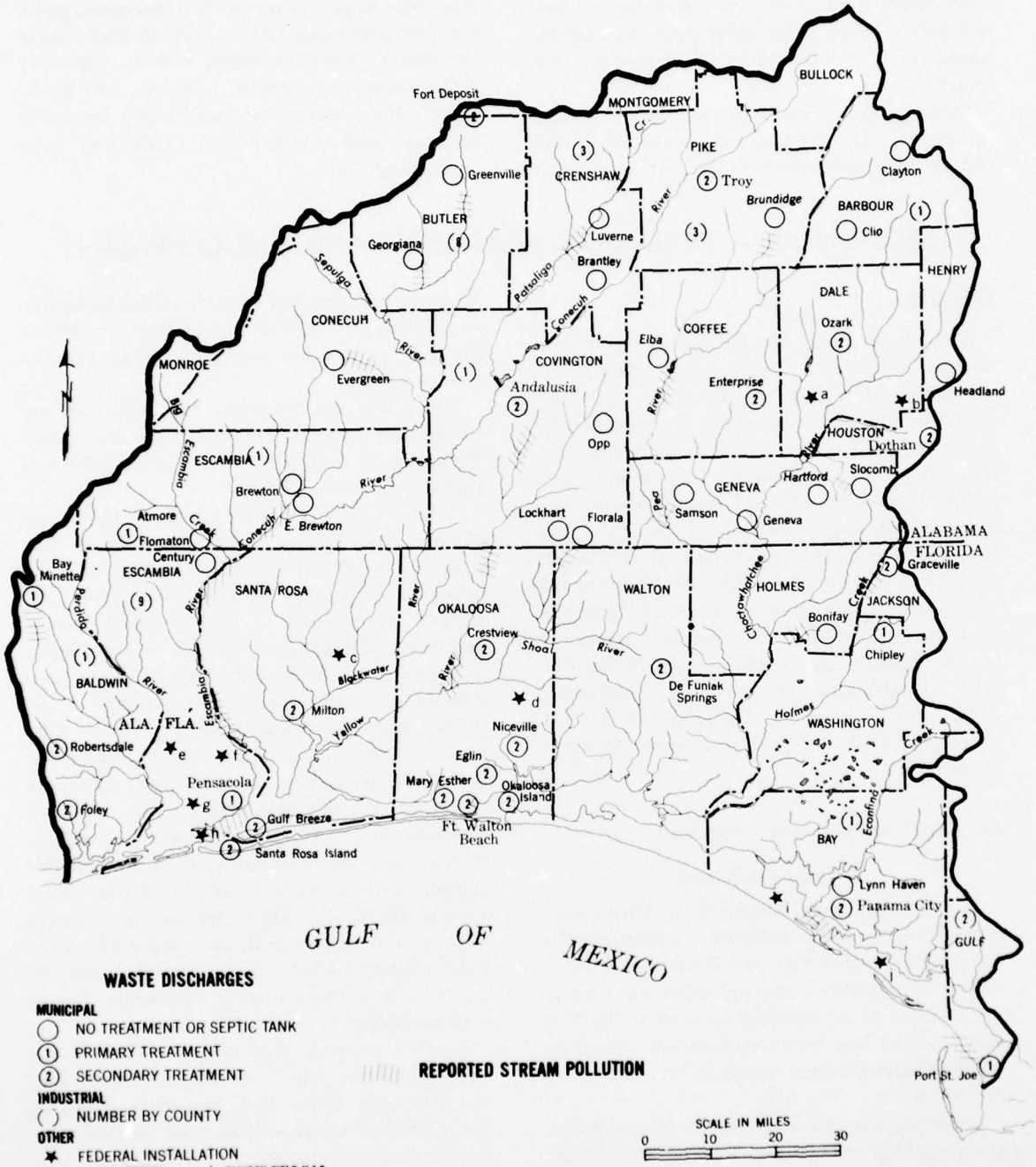
A branch of Five Runs Creek in Covington County, Alabama, was darkly colored and had a turpentine odor. In Baldwin County, Alabama, a branch of Hollingsham Creek was reported to have a strong odor, a low dissolved oxygen and rather high phenol content, and to be highly colored and turbid. Escambia Bay had a chemical odor, a gray color, and some turbidity at the point where the wastes from a synthetic fiber plant entered. Bayou Chico was highly turbid, and some scum was observed near the waste outlet of a plant producing resins. The decomposition of sludge banks which have developed over the years has resulted in anaerobic conditions in many parts of the Bayou Chico. Elevenmile Creek, which receives waste from a pulp and paper mill, was reported to be dark, slightly turbid, and to contain some deposits. Waste from mining operations caused high turbidity in some other streams.

Inplant recovery processes in a few of the large industries which discharged wastes into the Escambia River had somewhat improved the conditions which existed prior to 1960. The liquid waste discharges are reported to have caused fish kills in Escambia River and Bay.

An inventory was made of the 1960 municipal

POLLUTION ABATEMENT

1960



WASTE DISCHARGES

MUNICIPAL

- ◯ NO TREATMENT OR SEPTIC TANK
- (1) PRIMARY TREATMENT
- (2) SECONDARY TREATMENT

INDUSTRIAL

- ( ) NUMBER BY COUNTY

OTHER

- ★ FEDERAL INSTALLATION
  - a FORT RUCKER
  - b NAPIER FIELD N.A.S.
  - c WHITING FIELD N.A.S.
  - d EGLIN A.F.B.
  - e SAUFLEY FIELD N.A.S.
  - f ELLYSON FIELD N.A.S.
  - g CORRY FIELD A.F.B.
  - h PENSACOLA N.A.S.
  - i NAVY MINE LAB
  - j TYNDALL A.F.B.

REPORTED STREAM POLLUTION

Figure 2.33

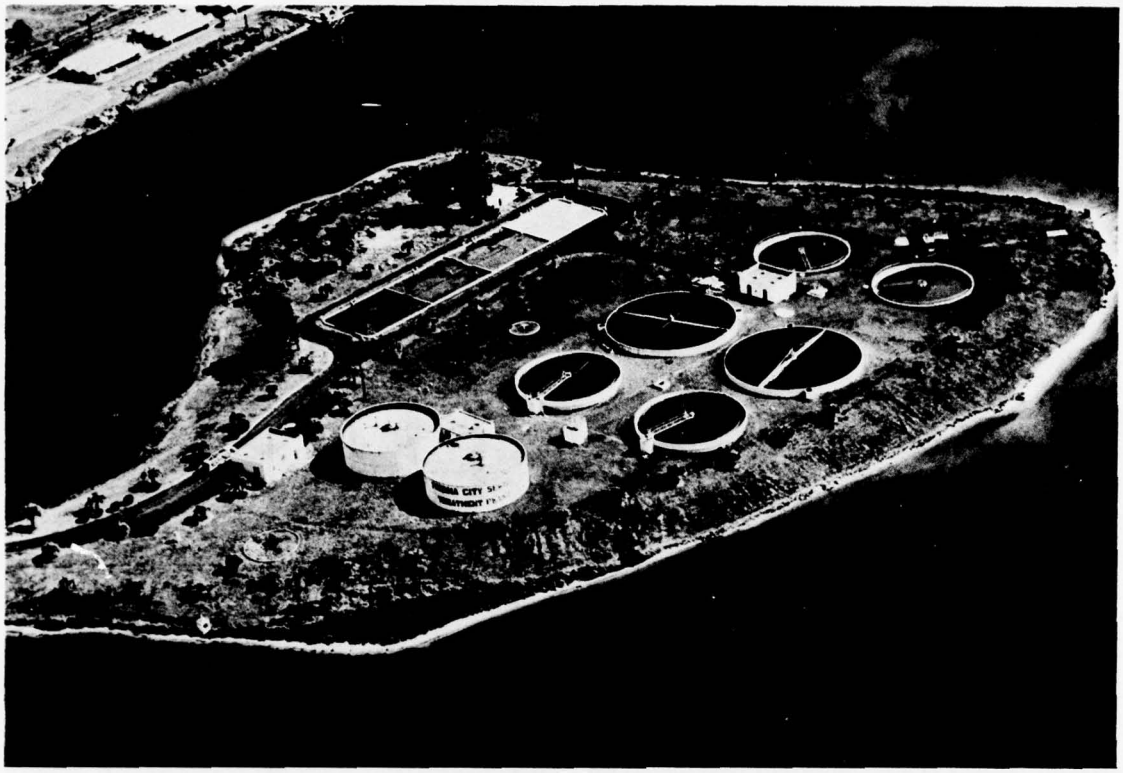


Figure 2.34 *Modern Trickling Filter Sewage Treatment Plant.*

and industrial water uses and waste discharges. Some 73 systems at 68 places discharge waste from an estimated 263,700 people living in municipalities, surburban areas, or Federal installations.

Thirty industries also maintained separate waste systems in 1960. All but three of the industrial plants provided some degree of waste treatment. However, the partial treatment provided by some did little to reduce the pollutional effect of the wastes on the receiving stream. Observations of the streams below waste discharge points and reports of stream conditions indicated unsatisfactory handling of the waste in some areas.

Air Pollution Monitoring

There were ten major sources of industrial air pollution in Florida. These included two sources in Pensacola, three outside the city limits of Pensacola in Escambia County, one in Bay County, three in Santa Rosa County, and one near Port St. Joe. The industries involved were a wood-products processing plant, three pulpmills, one superphosphate plant, a nylon plant, a coal-fired steam electric plant, and three chemical plants. These plants released gas, smoke, and particles into the atmosphere. No information was available on municipal and private sources of air pollution.

Radiation Monitoring

In 1960 there were 25 licensed radioactive isotope users in the Florida portion of the basins. There were no nuclear reactors. The Florida State Department of Health, in cooperation with various universities, has maintained a water monitoring program for several years, and surveillance work was carried out on Dauphine Island near Mobile, just outside the area. Federal agencies have a responsibility in monitoring programs to measure the total radiation concentration in the atmosphere.

WASTE LOADING-1960
BASED ON 1960 POPULATION

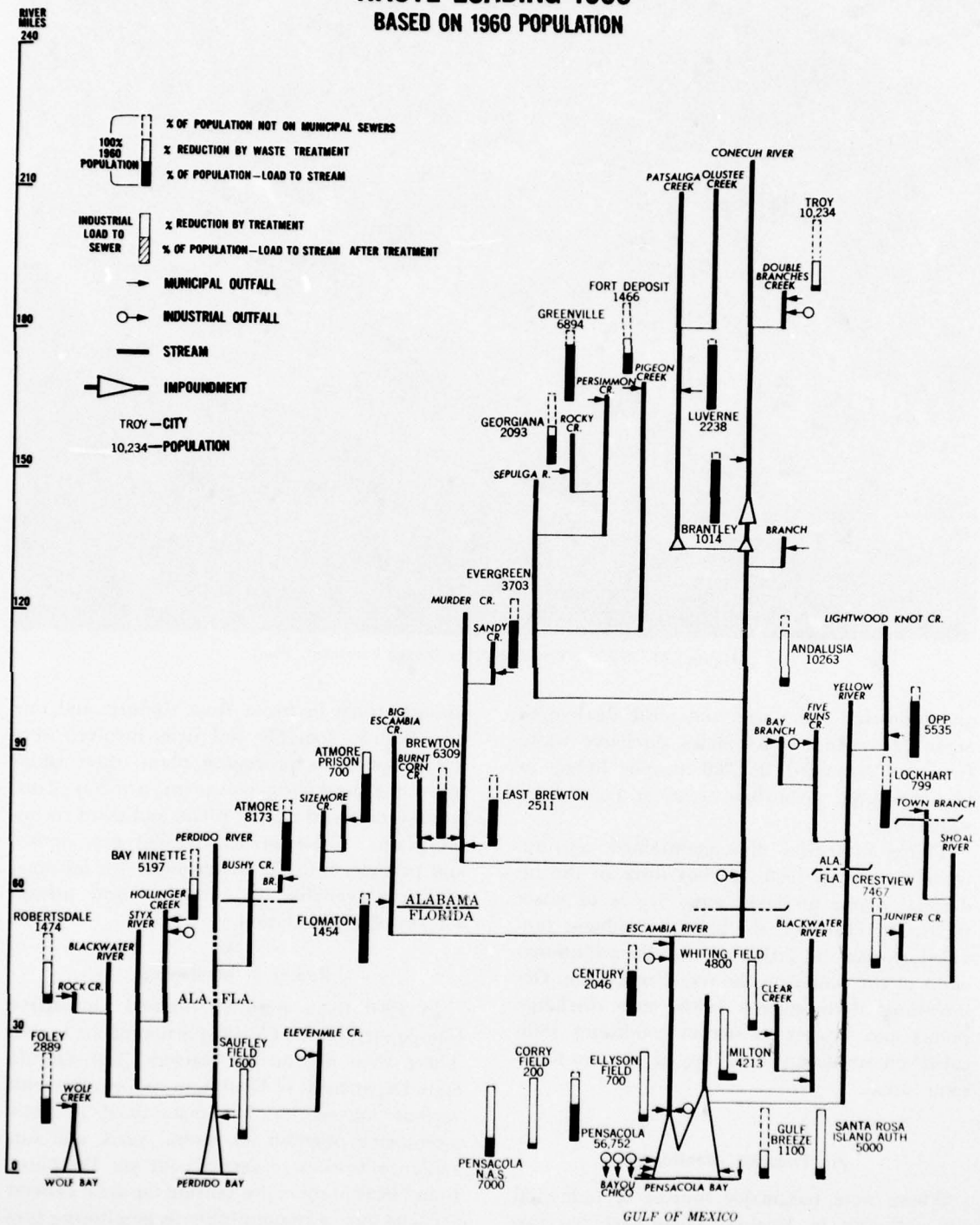


Figure 2.35

WASTE LOADING-1960
BASED ON 1960 POPULATION

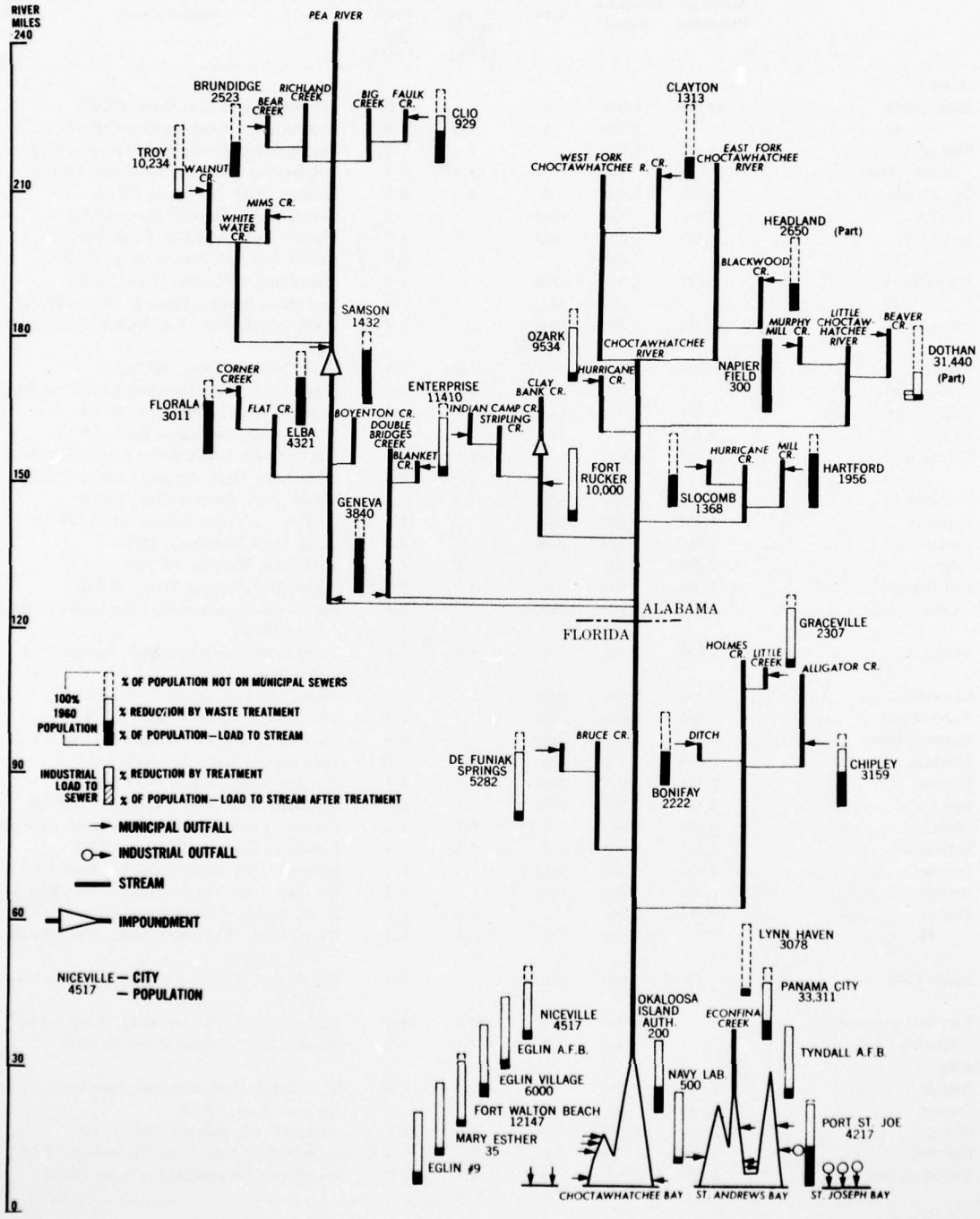


Figure 2.36

TABLE 2.14

Municipal Pollution in 1960

Municipality	Municipal Population	Population Served	Treatment			Receiving stream
			Type[1]	Design capacity PE[2] (1,000)	Waste load PE[2] (1,000)	Load to stream
Alabama						
Andalusia #1	10,263	4,000	2	4.5	4.0	Bay Branch, Five Runs Creek; PE 0.6
#2	--	4,000	2	4.5	4.0	Conecuh River, Escambia River; PE 0.6
Atmore	8,173	7,000	1	4.5	7.0	Branch, Brushy Creek, Perdido River; PE 5.6
Atmore Prison	700	700	1	1.0	0.7	Wet Weather Creek, Sizemore Creek; PE 0.49
Bay Minette	5,197	3,000	1	5.0	3.0	Hollinger Creek, Styx River; PE 1.8
Brantley	1,014	900	none	--	0.9	Conecuh River, Escambia River; PE 0.9
Brewton #1	6,309	1,000	none	--	1.0	Murder Creek, Burnt Corn Creek; PE 1.0
#2	--	3,000		--	3.0	Burnt Corn Creek, Conecuh River; PE 3.0
Brundidge #1	2,523	1,000	none	--	1.0	Mims Creek, Whitewater Creek; PE 1.0
#2	--	200	none	--	.02	Bear Creek, Richland Creek, Pea River; PE 0.2
Clayton	1,313	400	none	--	0.4	Lindsey Creek, West Fork Choctawhatchee River; PE 0.4
Clio	929	600	0	1.0	0.6	Faulk Creek, Big Creek; PE 0.42
Dothan (part)	--	12,000	2	25.0	12.0	Beaver Creek, Lower Choctawhatchee River; PE 1.5
East Brewton	2,511	1,600	none	--	1.6	Murder Creek, Coneuch River; PE 1.6
Elba	4,321	2,700	none	--	2.7	Pea River, Choctawhatchee River; PE 2.7
Enterprise #1	11,410	6,000	2	12.0	2.8	Blanket Creek, Double Bridge Creek; PE 0.152
#2	--	3,000	2	3.5	1.8	Indian Camp Creek, Stripling Creek; PE 0.152
Evergreen	3,703	2,500	none	--	2.5	Murder Creek, Conecuh River; PE 2.5
Flomaton	1,454	1,200	none	--	1.2	Big Escambia Creek, Escambia River; PE 1.2
Florala	3,011	2,300	none	--	2.3	Corner Creek, Flat Creek; PE 2.3
Foley	2,889	1,500	1	1.0	1.2	Wolf Creek, Wolf Bay; PE 0.96
Fort Deposit	1,466	700	1	1.0	0.7	Pigeon Creek, Conecuh River; PE 0.42
Geneva	3,840	2,800	none	--	2.8	Pea River and Double Bridges Creek, Choctawhatchee River; PE 2.8
Georgiana	2,093	1,100	0	1.0	1.1	Rocky Creek, Persimmon Creek, Sepulga River; PE 0.88
Greenville	6,894	5,500	none	--	5.5	Persimmon Creek, Sepulga River; PE 5.5
Hartford	1,956	1,450	none	--	1.45	Mill Creek, Hurricane Creek; PE 1.45
Headland (part)	--	1,000	none	--	1.0	Blackwood Creek, Choctawhatchee River; PE 1.0
Lockhart	799	450	none	--	0.45	Town Branch, Yellow River; PE 0.45
Luverne	2,238	2,000	none	--	2.0	Patsaliga Creek, Conecuh River; PE 2.0
Opp	5,535	4,500	none	--	4.5	Lightwood Knot Creek, Yellow River; PE 4.5
Ozark	9,534	7,000	2	10.0	3.255	Hurricane Creek, Choctawhatchee River; PE 0.102
Robertsdale	1,474	900	2	2.5	0.9	Blackwater River, Perdido Bay; PE 0.2
Samson	1,932	1,400	none	--	1.4	Boyenton Creek, Sandy Creek, Pea River; PE 1.4
Slocomb	1,368	600	none	--	0.6	Hurricane Creek, Choctawhatchee River; PE 0.6
Troy #1	10,234	4,000	2	6.0	2.2	Double Branch, Conecuh River; PE 0.15
#2	--	4,000	2	6.0	2.2	Walnut Creek, Whitewater Creek, Choctawhatchee River; PE 0.15
Napier Field	300	300	none	--	0.3	Murphy Mill Creek, Lower Choctawhatchee River; PE 0.3
Fort Rucker (Army)	--	10,000	2	20.0	10.0	Claybank Creek, Choctawhatchee River; PE 0.5
Hanchey Field	--	300	3	0.7	0.3	Branch, Choctawhatchee River; PE 0.045
Florida						
Bonifay	2,222	1,260	0	undet.[4]	1.26	Ditch-Holmes Creek, Choctawhatchee River; PE 1.0
Century	2,046	1,300	none	--	1.3	Escambia River; PE 1.3
Chipley	3,159	2,500	1	3.0	2.5	Alligator Creek, Holmes Creek; PE 1.0
Crestview	7,467	5,775	2	6.0	5.775	Juniper Creek, Shoal River, Yellow River; PE 0.7
DeFuniak Springs	5,282	3,870	2	4.8	3.87	Bruce Creek, Choctawhatchee River; PE 0.6

(continued)

TABLE 2.14—Continued

Municipality	Municipal Population	Population Served	Treatment			Receiving stream
			Type[1]	Design capacity PE[2] (1,000)	Waste load PE[2] (1,000)	Load to stream
Eglin Village	6,000	6,000	2	10.0	6.0	Ditch-Choctawhatchee Bay; PE 1.2
Fort Walton Beach	12,147	11,011	2	10.0	11.0	Santa Rosa Sound; PE 0.8
Graceville	2,307	2,000	2	2.5	2.0	Little Creek, Holmes Creek, Choctawhatchee River; PE 0.2
Gulf Breeze	1,100	410	1	undet.[4]	0.41	Santa Rosa Sound; PE 0.155
Lynn Haven	3,078	300	0	0.2	0.3	North Bay, St. Andrew Bay; PE 0.25
Mary Esther	--	35	2	0.4	0.35	Ditch-Santa Rosa Sound; PE 0.005
Milton	4,213	4,690	2	6.0	0.14	Creek, Escambia Bay; PE 0.1
Niceville	4,517	3,645	2	5.0	3.645	Valparaiso Bay; PE 0.6
Okaloosa Island Authority	--	200	2	2.0	0.2	Santa Rosa Sound; PE 0.075
Panama City #1	33,311	16,500	2	30.0	16.5	Watson Bay, St. Andrew Bay; PE 1.7
#2	--	10,000	1	20.0	10.0	St. Andrew Bay; PE 6.0
Woodlawn Subdivision	410	350	1	1.1	0.35	North Bay, St. Andrew Bay; PE 0.175
Pensacola #1	56,752	32,400	1	28.8	32.4	Pensacola Bay; PE 19.44
#2	--	17,600	1	26.4	17.6	Pensacola Bay; PE 10.6
Mayfair Subdivision	1,400	1,400	2	1.4	1.4	Bayou Marcus Creek, Perdido Bay; PE 0.07
Montclair Subdivision	3,850	3,850	2	3.5	2.85	Bayou Marcus Creek, Perdido Bay; PE 0.193
Morena Court Subdivision	2,800	2,800	2	2.1	2.8	Ditch-Bayou Chico; PE 0.084
Pen Haven Subdivision	5,250	5,250	2	3.0	9.156	Ditch-Bayou Chico; PE 0.252
Port St. Joe	4,217	4,150	1	7.5	4.15	St. Joseph Bay; PE 1.2
Santa Rosa Island Authority[3]	--	5,000	2	4.0	5.0	Santa Rosa Sound; PE 0.8
Eglin Air Force Base	--	undet.[4]	2	10.0	undet.[4]	Choctawhatchee Bay; PE undetermined
Field #9	--	undet.[4]	2	5.0	undet.[4]	Santa Rosa Sound; PE undetermined
Whiting Field Naval Air Station	--	4,800	2	7.0	4.8	Clear Creek, Blackwater River; PE 0.09
Navy Mine Laboratory	--	500	2	3.0	0.5	St. Andrew Bay; PE 0.025
Tyndall Air Force Base	--	undet.[4]	2	11.5	14.6	Gulf of Mexico; PE 0.95
Corry Field Air Force Base	--	200	2	2.1	0.2	Branch, Bayou Chico; PE 0.01
Ellyson Field Naval Air Station	--	700	2	1.2	0.7	Pensacola Bay; PE 0.02
Pensacola Naval Air Station	--	7,000	1	17.0	7.0	Pensacola Bay; PE 1.8
Saufley Field Naval Air Station	--	1,600	2	2.1	1.6	Perdido Bay; PE 0.05
Total		263,685				

NOTES: [1] Treatment: 1 = primary, 2 = secondary, 3 = stabilization pond, 0 = septic tank.
[2] Population equivalent.
[3] Serves Pensacola Beach.
[4] Undetermined.

Results obtained during the period March 1958 to October 1960 from the Florida study and from three stations in Alabama indicated that a marked decrease in radioactivity in surface waters and rainfall occurred in the late spring of 1959 and continued until the French atomic tests in the latter part of February 1960. Radioactivity decreased in May 1960 and has remained negligible. No radioactivity increase in underground water has been detected. Some natural radioactive materials are contributing minor amounts of activity considerably below the maximum permissible level.

Solid Waste Disposal

In 1960, open dumps were the most common method of disposal used by the smaller communities in the basins. This type of disposal creates health problems and nuisances and is an unsatisfactory method. Only 11 municipalities and two Federal installations operated sanitary landfills, an acceptable, effective method of solid-waste disposal. Twenty-seven other communities used modified sanitary landfill methods which were not entirely acceptable because certain materials were burned and the wastes were not properly covered each day.

TABLE 2.15

Industrial Pollution Discharged to Streams[1]

Industry Type, number, and employees	Volume of waste (m.g.d.)[2]	PE[3] or type of waste	Type of treatment	Waste to stream PE[3]	Receiving stream
Chemical	1.000	46,000	None	46,000	Branch, Hollinger Creek
9	0.215	3,000	Settling and oil flotation	600	Branch, Five Runs Creek
1,915	0.010	(inorganic)	Recovery in plant		Escambia Bay
	0.725	8,000	pH adjustment, lagoon	3,200	Escambia Bay
	0.199	300	Ponds		Bayou Chico
	1.500	30,000	Settling	21,000	Bayou Chico
	3.890	(inorganic)	None		Escambia Bay
	2.510	13,500	pH adjustment, settling	12,000	Bayou Chico
	0.037	15,000	None	15,000	St. Joseph Bay
Mining	2.000	(inorganic)	Lagoon		Branch, Conecuh River
15	3.600	(inorganic)	Lagoon		Pea River
255	1.400	(inorganic)	Lagoon		Branch, Pigeon Creek
	1.400	(inorganic)	Lagoon		Branch, Pigeon Creek
	1.000	(inorganic)	Lagoon		Branch, Pigeon Creek
	2.000	(inorganic)	Lagoon		Branch, Pigeon Creek
	1.400	(inorganic)	Lagoon		Branch, Pigeon Creek
	1.400	(inorganic)	Lagoon		Branch, Pigeon Creek
	1.000	(inorganic)	Lagoon		Branch, Pigeon Creek
	0.700	(inorganic)	Lagoon		Branch, Pigeon Creek
	1.000	(inorganic)	Lagoon		Conecuh River
	1.400	(inorganic)	Lagoon		Providence Creek, Conecuh River
	1.400	(inorganic)	Lagoon		Undetermined
	1.400	(inorganic)	Lagoon		Branch, Conecuh River
	1.400	(inorganic)	Lagoon		Undetermined
Paper	32.000	125,000	Settling	100,000	St. Joseph Bay
4	32.000	170,000	Settling	144,000	Elevenmile Creek, Perdido Bay
4,144	24.288	59,000	Settling	44,200	Conecuh River
	13.680	171,500	Settling	137,000	St. Andrew Bay
Textile	1.000	212,000	Biological	4,100	Escambia River
1			submerged combustion		
6,000					
Metal	0.720	(inorganic)	Settling		Swamp, Escambia Bay
1					
175					

NOTES: [1] Industries discharging to land surface or water course.
[2] Million gallons per day.
[3] Population equivalent to indicate the industrial waste loadings.

In 1960, acceptable landfill operations were maintained at Ozark, Alabama, and at Lynn Haven, Panama City, Panama City Beach, Pensacola, Warrington, Crestview, Valparaiso, Wright, Fort Walton Beach, and Chipley, Florida. Eglin and Hulbert Air Force Bases in Okaloosa County, Florida, were also operating acceptable sanitary landfills. Country wide sanitary landfills were being operated in six Florida counties in conjunction with vector control programs. Solid wastes from industries in the basins were not creating any problems.

Vector Control

The coastal area, with its extensive tidal marshlands, has a serious insect problem. Salt marsh mosquitoes, dog flies, and sand flies occur in large numbers and greatly annoy residents and visitors to recreational areas. Deer flies and other biting insects occasionally are a problem. Salt marsh mosquitoes frequently breed after unusually high tides or heavy rains. The peak population of dog flies usually occurs in August through October. Bay grasses along the shore are believed to be the principal breeding places

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PLAN FOR DEVELOPMENT OF THE LAND AND WATER RESOURCES OF THE SOU--ETC(U)
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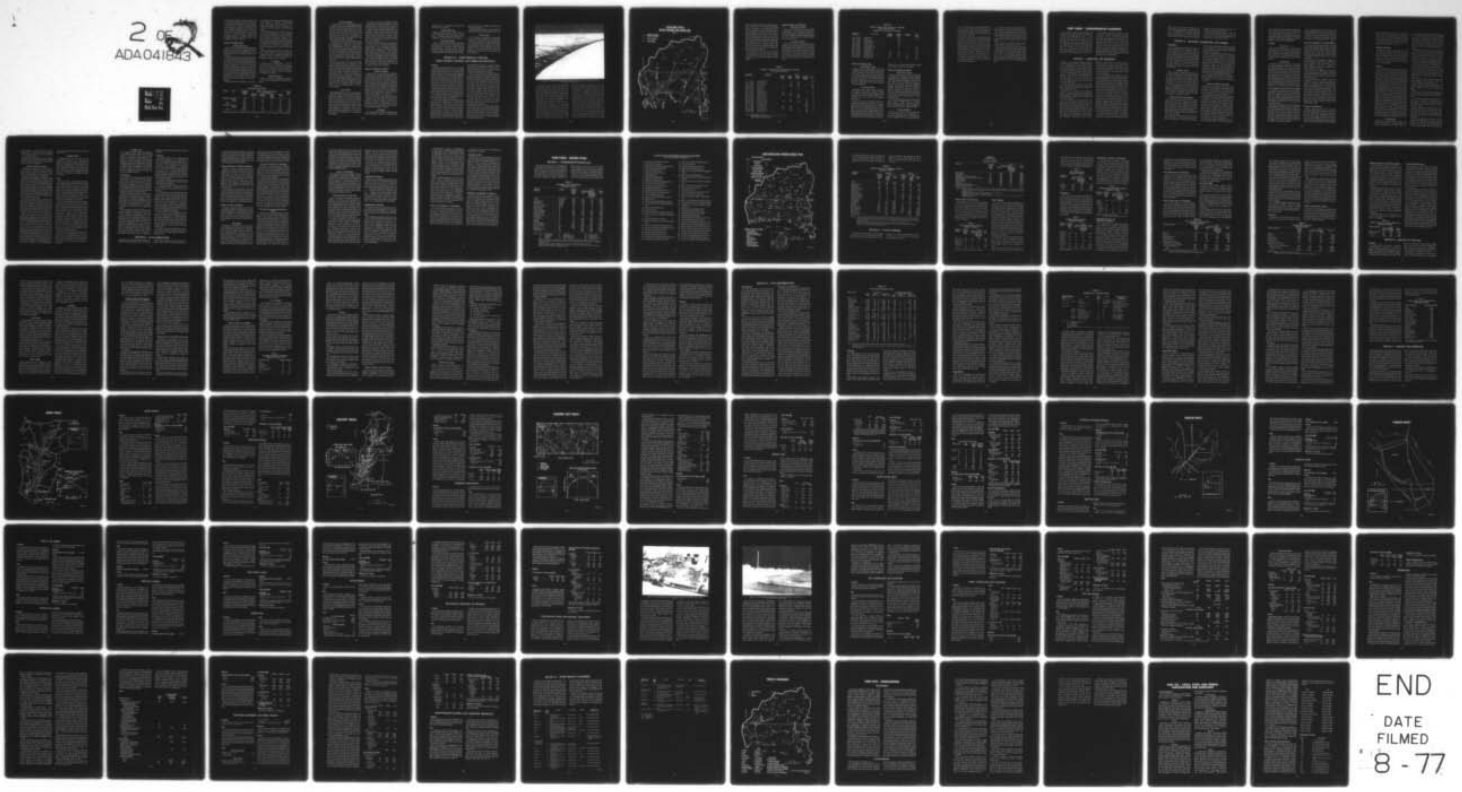

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of dog flies. Fresh-water swamps, marshes, and low lying areas which have received floodwaters are the principal breeding places for mosquitoes.

In 1960, vector control programs included modest mosquito programs in Andalusia, Atmore, Brewton, Evergreen, Geneva, Greenville, Opp, and Union Springs, Alabama; and county-wide vector control programs in Coffee and Covington Counties in Alabama, and in Bay, Escambia, Okaloosa, Santa Rosa, Walton, and Washington Counties, Florida.

Needs and Opportunities

Pollution Abatement

Prior to 1975 an estimated 392,000 additional people will be served by municipal sewerage systems. Approximately 1,284,000 people are expected to be served by municipal sewers by the year 2000.

Of the existing industries 13 should provide new or improved treatment facilities. The treatment plants should be designed specifically for the wastes to be handled and should provide adequate treatment to protect the receiving streams and maintain the quality of the water in the receiving stream so that it is suitable for reuse. With the industrial development expected by the year 1975, waste treatment facilities will be required for the new plants that are established. Prior to the year 2000, nearly all industrial waste treatment facilities will need to be enlarged.

Future municipal and industrial waste-treatment facility needs require consideration of the areas expected to develop. As development occurs, field studies will be necessary to determine the degree and type of treatment required to prevent pollution of the receiving streams.

In estimating municipal sewerage needs, all towns with a population over 800 and smaller towns which had sewerage systems in 1960 have been included. A minimum of primary treatment or equivalent has been considered necessary for proper handling of all wastes. Secondary treatment has been added wherever the assimilative capacity of the stream is inadequate to handle the effluent from a primary treatment plant.

The average minimum 7-day consecutive low flow expected once in 10 years has been determined and used in estimating the degree of treatment needed to prevent overloading the assimilative capacity of the streams.

Air Pollution

Available data in 1960 indicate a need for control of sources of air pollution in the basins. Most of the available data are for industrial sources of air pollution. Additional data on specific pollution and the extent of the problem in Alabama are needed.

Radiation Monitoring

There is a need for radioactivity surveillance as part of the expanding health program of the basins.

TABLE 2.16

Municipal Sewerage Needs*

Period	State	Population served* (1,000)	Number of places requiring new or enlarged				Number of places
			Primary treatment	Secondary treatment	Stabilization pond	Sewer system	
1960-1975	Alabama	213	12	8	21	41	41
	Florida	443	7	33	0	41	41
Total		656	19	41	21	82	82
1975-2000	Alabama	288	2	2	4	41	44
	Florida	996	5	35	----	59	63
Total		1,284	7	37	4	100	107

* Does not include Federal installations and State institutions for which no increase in population has been projected.

Solid Waste Disposal

A total of 88 sanitary landfill operations will be needed to serve an estimated 660,000 persons by the year 1975. The construction of an incinerator for one of the larger towns may be desirable by 1975; and prior to 2000, three other towns may need to construct incinerators for handling their solid wastes. Enlargement of other sanitary landfill operations could help meet the needs for the year 2000.

The amount of solid waste produced nationally averages about 1 cubic yard or 650 pounds per person per year. Disposal of waste by sanitary landfill requires 1 acre per 10,000 persons per year. Costs for collecting the wastes for the land and for operating the landfill varies with the size of the community and ranges between a total cost of $1.00 and $4.50 per capita per year. Landfill disposal also affords an opportunity to reclaim low marshy swamplands for other uses.

Cities with populations of more than 50,000 and with limited land area available for disposing of solid wastes may be required to construct incinerators. Construction costs of large incinerators range from $2,000 to $4,000 per daily ton capacity. Estimates indicate that a thousand persons in a large metropolitan area will contribute 1 ton of refuse per day. Operational costs approximate $1.50 per ton, and collection costs approximate $1.50 per person per year. The ashes and noncombustible material remaining after incineration require approximately 1 acre per 30,000 people per year for proper disposal.

Vector Control

The establishment of a vector control district in Baldwin County, Alabama, and in Escambia, Santa Rosa, Okaloosa, and Walton Counties, Florida, is needed. Such a system of contiguous vector control districts will be needed to efficiently and economically control salt-water mosquitoes, dog flies, houseflies, and other vectors in the coastal area. Each district will eventually need draglines for permanent control work. Intensification of all existing vector control programs and the establishment of new programs are necessary.

In urban areas, the vector problem of disease-carrying insects is frequently associated with improper disposal of waste. In about 15 percent of the towns studied, overflowing septic tanks were a problem and created ideal breeding places for mosquitoes. Many housefly, rodent, and roach problems in cities are associated with inadequate refuse storage and disposal practices in both residential and business sections. Illegal dumping of waste materials along country roads can also create problems.

Potential malaria mosquito breeding problems have been created in south-central Alabama by strip mining of iron ore. Inadequate drainage or clogged creeks, canals, and drainage ditches provide excellent breeding areas. The Alabama State Department of Health is concerned that major vector problems may develop in the future.

Abandoned, unplugged artesian wells originating in limestone aquifers produce an alkaline water that is favorable for the production of malaria mosquitoes. Several such wells exist. The lack of sanitation around farms also can result in serious fly and vector problems.

Means of Meeting the Needs

Pollution Abatement

Surface water of a quality that is suitable for reuse should be maintained throughout the area. A policy of pollution prevention as well as abatement would be desirable. The discharge of inorganic wastes could be curtailed. Treatment should be provided for all industrial and municipal wastes prior to their discharge into the watercourses. The type of treatment would depend upon the waste to be treated and the degree of treatment would depend on the assimilative capacity of receiving streams. A separate determination will be needed for each case.

Where streamflows are not adequate to provide proper dilution of effluents from secondary treatment plants, either the water-storage structures built to release additional water for augmenting low flows or a higher degree of treatment is necessary to adjust the waste loadings to the minimum streamflow condition.

Air Pollution

The responsible State agency working cooperatively with those industries or municipalities

responsible for air pollution can develop an effective control program.

Radiation Monitoring

Radiation levels could be recorded and continuous monitoring employed to detect any increase in radiation which would affect the development of the land and water resources.

Solid Waste Disposal

Sanitary landfills provide the best method for disposal of solid wastes from communities having suitable land available within reasonable hauling distance. Low marsh areas could be utilized. Properly maintained landfill disposal could help prevent the breeding of flies, rodents, and roaches, and will eliminate the nuisance of burning open dumps.

Sanitary landfill methods of solid-waste disposal should be adopted throughout the area.

Vector Control

In the interest of efficiency and economy, vector control programs could be carried out on a district or county basis. State governments can best handle research, technical supervision, and training of district personnel. For a vector control program to be compatible with other purposes, it is essential that the interests of agriculture, wildlife conservation, and health all be coordinated.

SECTION XII – OTHER BENEFICIAL PURPOSES
BEACH EROSION CONTROL AND HURRICANE PROTECTION

General

The beaches along the basins coast are among the most valuable resources of the area. Many residents and vacationers are attracted by the superb beaches on the islands and mainland shores. The influx of new industries, residents, and tourists to coastal areas is increasing at a rapid rate. Preserving and restoring the shoreline from the effects of beach erosion and preventing loss of lives and damages to property caused by the high tides, waves, and winds of hurricanes are of great importance to the area.

The basins shoreline of about 150 miles has several long barrier islands that front the coast. Some 70 miles of coast are in advanced stages of the barrier-formation process where the lagoons have been filled, or partially filled, and the islands have joined the mainland.

At the eastern edge of the basins, the mainland shore of St. Joseph Bay is a narrow sand beach with a few marshy areas near the south end. Northward and westward past Mexico Beach to Crooked Island the beach widens into several rows of foredunes and beach ridges. Crooked Island is a curved spit about 10 miles long that almost completely encloses St. Andrew Sound. Between Crooked Island and Hurricane Island, the next spit to the west, there is an open stretch of coast about 5 miles long. There are many shallow sandbars just offshore, and a cuspate spit fronted by an unstable shifting sand island has formed about midway.

Hurricane Island, also called Shell Island, is a barrier spit that joins the mainland coast at Panama City Beach. An entrance channel has been cut through this spit. Short jetties project on the seaward side. Offshore from this channel and westward to Pensacola, the bottom drops off steeply. Along this entire stretch two sandbars parallel the beach and lie about 200 feet and 700 feet offshore. Beach material is available nearly everywhere. Most of the beach sand is white and medium fine and consists of more than 98 percent quartz. From Panama City Beach to Santa Rosa Island, a cliff 10 to 30 feet high rises back of the beach and shows that the present shore represents net retreat during the present sea level stand. The cliff is generally covered with grass.

Santa Rosa Island is a 47-mile long, narrow barrier island with a wide, white-sand beach and active sand dunes. Westward from Santa Rosa Island to Perdido Pass lies a barrier island 15 miles long. From Perdido Pass westward, the 5 miles of mainland beach in Alabama complete the shoreline of the basins.

Figure 2.37 *Beautiful White Sand Provides Attractive Beaches — Mexico Beach, Florida, Ten Miles Northwest of Port St. Joe.*

Vegetation is sparse on the islands and along the exposed mainland shores. Elevations are generally 10 to 20 feet above mean sea level. In places, the higher protective dunes have been leveled for housing developments. Many miles of shore, particularly on the eastern end of Santa Rosa Island, are still in their natural state. Other shore areas, especially near Panama City and Pensacola, are highly developed.

Beaches change from day to day under the influence of tides, currents, waves, and winds. The Gulf coast tidal differences are small. The 60-foot bottom contour ranges from 7 miles offshore at the eastern end of the basins to less than a mile in places at the western end. Wave heights are higher along the western shore than in the shoal regions farther to the east. The direction of movement of littoral drift, or material moved under the influence of waves and currents, is complex along this stretch of coast. Near Panama City, drift appears to be from the northwest to southeast, or opposite that of the drift at St. Joseph Spit. There are indications of a zone at the southeast end of Hurricane Island where the littoral drift approaches from both directions. Near the entrance to Choctawhatchee Bay, the drift is eastward. Farther west, at the western end of Santa Rosa Island and the entrance to Pensacola Bay, the drift is to the west and continues westward to Perdido Pass.

At many places along these basins there is a relatively rapid rate of change in the beach erosion and accretion processes. Rapid changes are occurring at Cape San Blas, where the outer shore of St. Joseph Spit is eroding; in the vicinity of Mexico Beach, where the beach is advancing;

HURRICANE PATHS
BEACH EROSION AND ACCRETION
1960

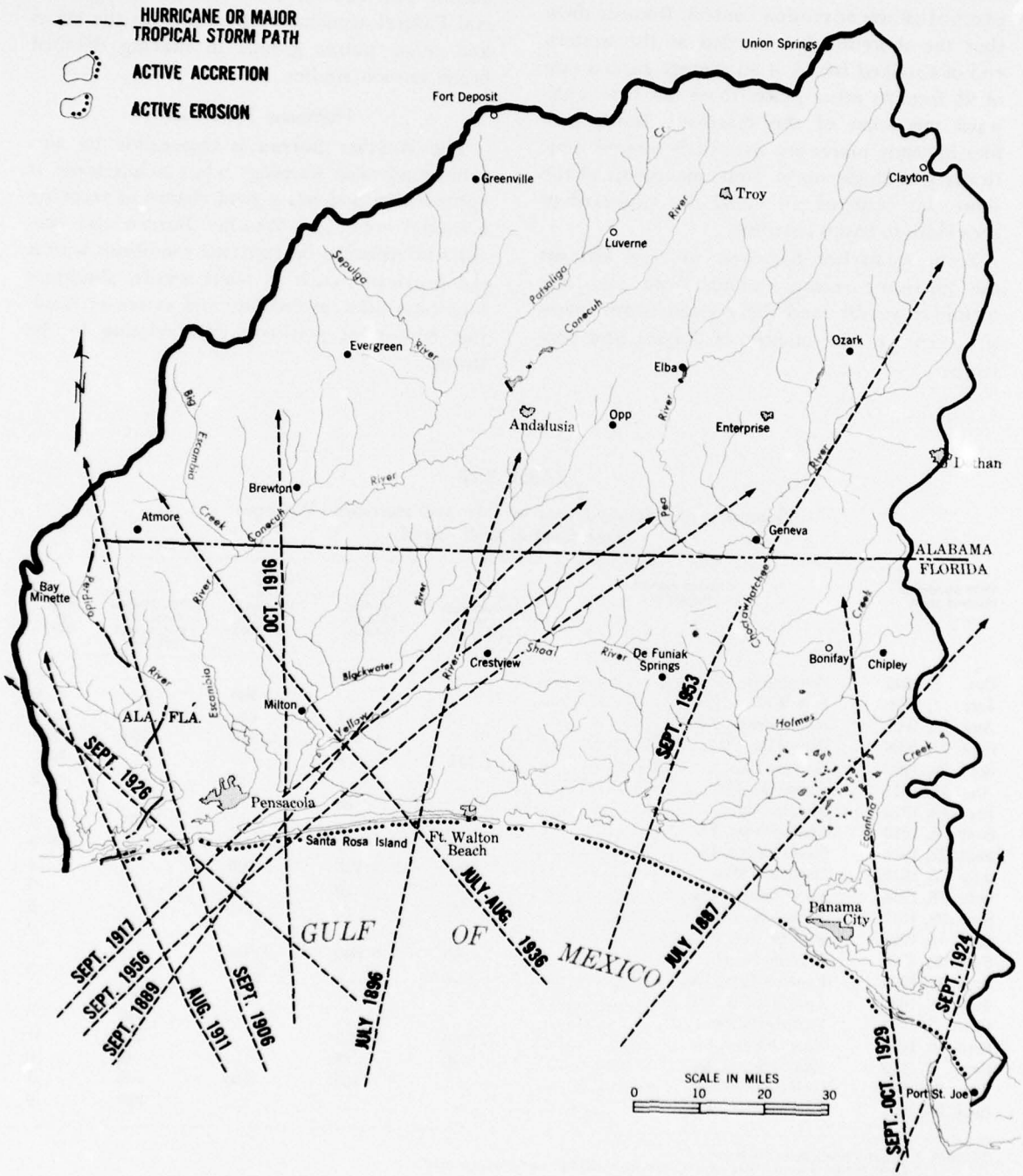


Figure 2.38

and at Hurricane Island near Panama City, where the east end of the island is growing. Erosion is basically a natural problem, but it has been aggravated by navigation improvements, shoreline construction, and even by ill-planned efforts at erosion control. Records show that the shoreline has receded at the western end of Crooked Island at an average annual rate of 93 feet. At other places there has been gulfward migration of the shoreline. Beach profiles in many places are frequently altered drastically in a single storm. Some movement of the shore has occurred all along the Choctawhatchee-Perdido basins coastline.

From Apalachee Bay west to New Orleans the hurricane season extends from mid-June to mid-November and the greatest storm intensity occurs in the months of August and September.

Existing Facilities and Programs

Beach Erosion Control

There are no beach erosion control facilities of significance in the Choctawhatchee-Perdido basins. The Federal Government, through several Federal agencies, cooperates with the States and other public groups in making detailed beach erosion studies.

Hurricane Protection

The Weather Bureau is responsible for furnishing advance warnings when a hurricane is approaching and has a good chance of reaching a coastal area. The Weather Bureau also provides information on expected conditions within the hurricane, such as wind speeds, abnormal hurricane tides, probability and extent of flooding, and other pertinent data relating to the storm.

TABLE 2.17

Summary of Reported Loss of Life and Hurricane Damages
East Central Gulf Coast

Date hurricane crossed coast	Crossed coast in vicinity of	Vicinity				
		Mississippi coast ($1,000)	Mobile, Alabama ($1,000)	Pensacola, Florida ($1,000)	NW. Florida (excl. of Pensacola) ($1,000)	Loss of life[1]
Oct. 2, 1893	Pascagoula, Miss.	--	150	--	--	1,500
July 7, 1896	Fort Walton, Fla.	--	--	400	--	0
Aug. 15, 1901	New Orleans, La.	12	100	112	--	10
Sept. 27, 1906	Pensacola, Fla.	--	1,650	3,220	195	151
Sept. 20, 1909	Houma, La.	1,035	14	--	--	[2]350
Aug. 11, 1911	Pensacola, Fla.	--	--	12	--	0
Sept. 14, 1912	Mobile, Ala.	--	12	25	--	1
Sept. 4, 1915	Apalachicola, Fla.	--	--	--	25	0
Sept. 29, 1915	New Orleans, La.	1,500	75	--	--	[3]275
July 5, 1916	Gulfport, Miss.	140	2,425	1,000	--	13
Oct. 18, 1916	Fort Walton, Fla.	--	10	100	--	0
Sept. 28, 1917	Pensacola, Fla.	--	--	170	--	5
Sept. 15, 1924	Port St. Joe, Fla.	--	--	--	100	0
Sept. 20, 1926	Perdido Beach, Ala.	200	5,000	4,374	--	[4]4
Sept. 30, 1929	Panama City, Fla.	--	--	60	150	2
July 31, 1936	Fort Walton, Fla.	--	--	--	670	4
Oct. 7, 1941	Carrabelle, Fla.	--	--	--	340	5
Sept. 19, 1947	New Orleans, La.	17,480	1,212	--	310	51
Sept. 4, 1948	New Orleans, La.	140	88	--	12	0
Aug. 30, 1950	Gulf Shores, Ala.	--	500	250	300	1
Sept. 26, 1953	Fort Walton, Fla.	--	--	--	200	0

NOTES: [1] Includes fatalities in Louisiana.
[2] Three fatalities in Alabama and Mississippi, remainder on Louisiana coast.
[3] Eighteen fatalities on Mississippi coast.
[4] Additional 238 fatalities in peninsular Florida.

TABLE 2.18

Maximum Hurricane Tides, Selected Years 1900-1956
East Central Gulf Coast
(elevations in feet above mean sea level)

Date hurricane crossed coast	Crossed coast near	Pensacola, Florida (Gulf Beach)	Pensacola, Florida (City)	Fort Walton, Florida	Panama City, Florida
Sept. 27, 1906	Pensacola, Fla.	--	10.0	--	6.0
Sept. 14, 1912	Mobile, Ala.	--	2.0	--	--
July 5, 1916	Gulfport, Miss.	--	5.0	--	--
Oct. 18, 1916	Fort Walton, Fla.	--	3.0	--	--
Sept. 28, 1917	Pensacola, Fla.	--	4.5	--	--
Sept. 15, 1924	Port St. Joe, Fla.	--	1.6	--	--
Sept. 20, 1926	Perdido Beach, Ala.	--	9.4	4.0	6.0
July 31, 1936	Fort Walton, Fla.	--	--	--	4.7
Oct. 7, 1941	Carrabelle, Fla.	--	--	--	2.2
Sept. 19, 1947	New Orleans, La.	3.5	3.9	--	3.5
Sept. 4, 1948	New Orleans, La.	2.2	3.4	--	3.0
Aug. 30, 1950	Gulf Shores, Ala.	4.3	4.5	4.1	5.0
Sept. 26, 1953	Fort Walton, Fla.	2.2	2.6	4.5	4.7
Sept. 24, 1956	Fort Walton, Fla.	3.3	--	5.0	5.0

Needs and Opportunities

Beach Erosion Control

Where shores are undeveloped, or where development occurs well back from the shore, variations in the beach cause little concern. However, beaches, dunes, and the low areas adjacent to the shore are becoming increasingly important for recreation and for construction of homes. Shoreline modifications by erosion and accretion have important effects on the associated animal and plant life.

Hurricane Protection

Hurricanes, being violent storms, frequently cause rapid and extensive shoreline changes. In addition to those changes, damages caused by hurricanes are those resulting from tidal inundation and wave action at above-normal water levels.

The recent advent of Federal assistance in hurricane protection has presented new opportunities for the development of coastal engineering criteria and has stimulated further research. There is a trend toward multiple-purpose planning in solving coastal problems. This involves coordinating stabilization, navigation inlet channel improvement and maintenance, and hurricane protection. Projects of this type are likely to develop in the future along the Gulf shores where barrier beaches are prevalent.

Means of Meeting the Needs

Beach Erosion Control

Beach erosion protection can be accomplished by adding sand artificially, and then possibly augmenting the sand placement with auxiliary structures. Artificial nourishment itself has the least adverse effect on a locality and appears to offer the best solution, provided a sufficient quantity of material for beach nourishment is available. Wind-erosion protection can be provided by vegetation or sand fences. Both are effective in forming and stabilizing dunes. Dunes act as barriers to high water and strong onshore winds but they are more important as a source of beach material.

Because of the many factors involved in beach erosion and the possible effects of one beach upon another, specific remedial measures should be proposed for the erosion problems of these beaches after onsite studies are made.

Hurricane Protection

The best way to prevent loss of human life in coastal areas during a severe hurricane is to evacuate the public before an oncoming hurricane can endanger the lives of the people pres-

ent or cut them off from safe high land. Many areas along the basins shoreline could be inundated during passage of a major hurricane by as much as 5 to 10 feet of hurricane tide with wave action in addition.

Since all of the coastal areas are expected to experience a great increase in urban development and recreational use by the year 1975, hurricane protection control needs to be implemented before this date. This would necessitate initiating a cooperative survey to determine all the elements of the problem. This survey would need to consider all influences such as tides, offshore currents, winds, hazards from hurricanes, and places of immediate danger.

In plans for development of the coastline into concentrated residential or resort areas, consideration should be given to:

(1) Adequate hurricane-warning systems, hurricane plan of action, and evacuation routes.

(2) Methods of reducing the potential danger or preventing additional future hazard areas by proper zoning, planning, and construction codes.

(3) Protecting sewage-disposal facilities from flooding and preventing contamination of water supply.

(4) Provision of auxiliary power supplies and alternative communication systems.

(5) Protective seawalls or similar structures to reduce the danger of damage from high waves.

The adoption of any plans for shore protection should be preceded by a thorough and complete study of the existing conditions, their causes, and possible remedial measures which would provide protection for existing waterfront improvements as well as the remaining beach area.

PART THREE – COMPREHENSIVE PLANNING

The procedures used in developing the comprehensive and coordinated plan are briefly summarized in the following four steps: (1) An inventory was made of basic resources and related developments within the basins; (2) needs for goods and services were projected to the year 2000 for the Choctawhatchee-Perdido basins; (3) alternative ways to meet needs for each purpose were studied; and (4) projects and programs that would best serve all purposes and meet requirements for resource conservation, utilization, and development were selected.

The character and effect of plans in other basins were considered in connection with the formulation of the Choctawhatchee-Perdido basins plan, and adjustments were made to permit optimum interbasin uses. Throughout the planning process, many factors such as those associated with geology, hydrology, engineering practices, and social characteristics were expressed in economic terms for convenience in making comparisons. Additional information on planning and plan formulation is provided in the Planning, Economics, Hydrology, and Engineering and Cost Appendixes.

SECTION I – OBJECTIVES AND GUIDELINES

Objectives and specific planning guidelines adopted to govern the study and Report follow.

(1) A comprehensive and coordinated plan for the development of the land and water resources of the Southeast River Basins through the year 2000 will be presented in the Report.

(2) The comprehensive plan will be recommended to the Governors and legislatures of the States of the study area and to the President and the Congress for use as a guide for land and water resources development in the Southeast River Basins area.

(3) The plan will set forth an early action phase which will include projects and programs found to be needed, feasible, and desirable for accomplishment by 1975.

(4) It will be recognized that additional studies of recommended programs and projects may be required to support specific requests for State and Federal support and for development by private agencies.

(5) All of the purposes enumerated in the Act will be given equal attention. In the completed plan, each purpose will be developed to that level consistent with the needs and economic capacity of the individual basin. Treatment of industrial development will be limited generally to indications of the effects of the plan on rates of development and to development implied in the projections of manufacturing employment. Recreation studies will be limited to public outdoor recreation related to land and water resources and to types beyond those normally provided by individuals and municipalities. Public health studies will be oriented toward determining the effects upon public health associated with the development of land and water resources.

(6) In determining the composition of the comprehensive plan, each separable component will be considered on the basis of the contribution that it makes in net benefits to the Choctawhatchee-Perdido basins, the Southeast River Basins, and the Nation. When intangible considerations play a major part in the decisions affecting an element of the program, they will be explained as fully as possible in narrative form.

(7) The comprehensive plan will: Provide information on benefits and costs, including monetary and nonmonetary values; contain information on the expected economic impacts created by the recommended elements of the plan; include general recommendations on cost sharing, reimbursement, and project payout; designate whether recommended developments should be implemented primarily by non-Federal or Federal entities; and designate which of the Federal agencies has the major responsibility for the Federal aspects of a project or program.

(8) The comprehensive plan will recognize and protect the rights and interests of individuals and of the States in determining the devel-

opment of land and water resources and the preservation and protection of established uses.

(9) The comprehensive plan will include the existing, authorized, and formally proposed works and programs of the Federal and non-Federal agencies with proposed modifications limited to those found desirable, feasible, and consistent with the study objectives.

(10) Recommendations will be made for periodic review of the comprehensive plan. This review will serve as a basis for keeping the plan current and for subsequent action.

SECTION II – PLANNING ASSUMPTIONS AND CRITERIA

Assumptions

The comprehensive plan is based upon a series of assumptions. The broadest of these are: (1) That the Nation is entering a period of relative stability in international relations with no worsening of the cold war and no widespread outbreak of hostilities; and (2) that throughout the period covered by the plan, to the year 2000, the Federal Government and non-Federal interests will cooperate in encouraging and implementing economic growth and development throughout all segments of society and all areas of the Nation.

Population Growth

Three principal assumptions concerning the rate of national population growth were adopted: (1) The present fertility level, 1955-57 average, will remain constant to sometime between 1975 and 1980, then decline to the 1949-51 level by 2005-2010; (2) there will be moderate declines in mortality rates to the end of this century; and (3) net migration from abroad will be constant at about 300,000 per year. State and area population estimates were made in conformance with the general assumptions, but special attention was given to conditions reflected by study and analysis of individual areas.

Economic Growth and Development

The assumptions concerning trends toward world peace and United States and regional population growths are paralleled by assumptions of upward trends in employment, production, consumptions, and foreign trade. For planning purposes, the gross national product was projected to increase from about $500 billion in 1960 to $888 billion by 1975 and to $2,300 billion by the year 2000.

A continuation of the trend in the human diet toward more red meats and more of some fruits and vegetables is reflected in the projections and plans for food production and land use. It is believed that per capita consumption of food will increase until about 1975 and then remain about constant.

In line with the general expansion of the national and regional economy, it was assumed that investment capital required to attain projected industrial growth and resource development will be available and that the education and technical skills necessary for an expanding industrial economy also will be available. It was further assumed, as a working procedure for preliminary studies, that land and water resources and electric power supply would not be limiting factors in attaining the projected economy of the Choctawhatchee-Perdido basins.

It was recognized in the study of the Choctawhatchee-Perdido basins that their economy is an integral part of the regional and national economies.

National and Regional Viewpoints

Because of the widespread effects of land and water resource development, a responsibility falls on all levels of government and on the private economy to participate in resource planning and in the execution of resource programs.

In developing the Southeast River Basins plan, national needs for food and fiber and for services are included at those levels warranted by the comparative advantage and existing economic potential of the Southeast River Basins area in relation to national resources and needs. Thus, the primary benefits shown for projects and programs provide a reliable index of project efficiency from the national point of view as well as the principal measure of regional and local benefits. Secondary benefits and impact studies provide additional evidence of the regional and local effects of resource development.

In developing projects and programs in the Choctawhatchee-Perdido basins plan, considera-

tion was given to national policy guides pertaining to land and water resources development that have resulted from legislation and to administrative policies or decisions that have prevailed. Policy guides and statements of national objectives used in the planning processes are discussed in the technical appendixes.

Criteria

Price Levels

Price levels prevailing on or about January 1960 were used for evaluating all present and future benefits and costs, except that an adjustment was made in agricultural prices based upon an assumption of a long-range parity ratio of 89 between prices paid and prices received by farmers.

Interest Rates

An interest rate of 2 5/8 percent was used as far as practicable in analyzing costs and benefits in project formulation. In certain instances, benefits and costs were extracted from available data, and it was impractical to adjust this interest rate when the interest-rate mix of the data was uncertain. The 2 5/8 percent interest rate meets the need for a relatively risk-free and inflation-deflation-free rate for use in evaluation of the economic effects of Federal resource projects and programs. For converting certain non-Federal costs and benefits to an annual equivalent basis, a 4 1/4 percent interest rate was used.

Life of Projects and Period Covered by Analysis

The period of analysis used in the studies for this Report was the economic life of each project or 50 years, whichever was the lesser. The possibility of a longer maximum period, up to 100 years, was considered in recognizing certain long-range effects of intangibles and other impacts, but effects beyond 50 years were not evaluated in monetary terms.

The plan was formulated to meet only those needs expected to develop to the year 2000, and the evaluations generally reflect no increase in use of facilities after the year 2000. Needs will naturally continue to grow after the year 2000, and many of the proposed projects and programs, by adding facilities, will have the capacity to absorb some of the growth. The potential of the plan to meet needs that develop after the year 2000 has not been evaluated.

The assumptions and criteria used are considered conservatively low. If more liberal criteria had been used, such as a period of analysis of 100 years and an increasing need after the year 2000, the projects and programs included in the plan would appear even more favorable.

Basis for Comparison of Projects Effects

Comparison and evaluation of the proposed projects and programs in the plan were made to determine the most effective use of economic resources, such as land, water, labor, and materials. In this way, actions and opportunities throughout the economy form a check on what is economically justified in the way of new plans and efforts.

The value of the projects or programs included in the plan are computed on the basis of future conditions "with" the projects or programs included in the plan as compared to future conditions "without" the projects or programs included in the plan.

The future "with" conditions for individual project or program analysis include all development which would be expected to occur during the period of analysis with the project or program in existence.

The future "without" conditions include all developments that are existing or under construction as of January 1960, assuming adequate operation and maintenance of those developments. Technological gains not directly associated with the projects and programs in the basins plan were recognized as part of the "without" condition. It was assumed that no part of the projects or programs would develop in the absence of the project or program. This is not to deny that, in the absence of the proposed plan, other plans would develop which might include many features similar to those in the comprehensive plan.

Timing of Development

Plans covering long periods into the future provide for needs which have not yet developed. Not all developments are needed at once or at the same time. Plan implementation should, therefore, be scheduled to meet the needs as they occur. A precise schedule of year-to-year development was not considered necessary, but a general order of priority was established. Those develop-

ments needed first are included in an early action phase and are generally based on filling the needs to the year 1975. If need arises, however, projects scheduled in the 1975-2000 period may and should be initiated earlier. Likewise, the rate of project initiation may be slowed down if conditions warrant slower action.

Discount Principles

Program or project benefits and costs, which are estimated to accrue at different times and over varying periods of time, were converted to annual equivalent values by use of compound interest or discount rates. The resulting values reflect the present worth at the inception of each program or project and provide a common basis of measurement.

Benefits

The ultimate aim of resource projects and programs, in common with all other productive activity, is to satisfy human needs and desires. Goods and services are produced to achieve this end. These goods and services have value in accordance with the demand for them and their availability. Benefits are of two general kinds, primary and secondary. Primary project benefits are the increase in the value of goods or services directly resulting from a project, less all associated nonproject costs incurred in their realization. Primary benefits are usually evaluated at the first point in the chain of effects of a project where the goods or services produced have an actual or estimated market value. Secondary benefits are the value of goods and services created in secondary activities affected by the project, less all associated costs incurred in their realization. The major part of the value of these goods and services is not measured from the national public point of view because it is assumed that an investment similar to that made in the project would create a similar effect in secondary activities if invested in other projects or other areas. However, overall secondary benefits are considered appropriate in illustrating the significance of projects from a regional point of view.

Primary Benefits

The primary tangible benefits, which in this Section are referred to as primary benefits, represent the estimated increase in the value of the actual goods, services, and satisfactions of a project or program expected for the period under study and from which any induced losses to other projects or programs have been deducted.

Justification of the facilities included in the plan for drainage, irrigation, and soil conservation are based on the increased net return to the farmer from the estimated production response.

The primary benefits from drainage and flood-loss prevention, resulting from the upstream watershed projects, are derived from net values for expected changes in land use, the increased productivity of land, the reduction of direct damage to agricultural crops and fixed improvements, and reduction of management costs.

The primary benefits from hydroelectric power are estimated as the cost of equivalent power from a modern steam-electric powerplant.

Primary benefits from the forestry program are estimated as the net stumpage value of increased production and the net leasing values received from the increased number of faces expected to be worked for production of gum-naval stores.

The primary benefits from the commercial fishery program are the estimated value of increased landings of commercial fish.

Primary benefits from the sport fisheries and wildlife program are the estimated value of projected increases in user-days of hunting and fishing.

Benefits used in the monetary evaluation of the recreation program consist of the estimated value of increased user-days of recreational activity.

The benefits from domestic, municipal, and industrial water supplies are assumed to be at least equal to the cost of obtaining water of similar quality and quantity from the cheapest alternative source.

Primary benefits from flood control are derived from the difference in flood losses "with" and "without" protection. For upstream watershed and local protection projects, enhancement and restoration benefits are also included where applicable.

Benefits of navigation are taken to be the savings in rate differential; the savings in shipping time; the reductions in operation and maintenance costs; the value of any filled land obtained through spoiling; and, for new deep-draft

harbor facilities, the increased gross revenues (increased costs associated with cargo handling are included as project costs); and savings due to use of larger tankers.

Justification of programs for vector control, solid-waste collection and disposal, air pollution and radiation monitoring, and pollution abatement is found in intangibles.

Secondary Benefits and Impacts

Although for purposes of this study a monetary evaluation of secondary economic effects of various resource projects and programs was not made, the importance of these secondary effects of resource development was recognized.

The projects and programs involving increased production of commodities will require additional raw materials, processing equipment, and more services to sustain the processing operation. These increased activities will extend throughout the basins. Trades and services especially would be stimulated by recreation, sport fishing, and wildlife developments. These impacts would particularly affect fishing camps, marinas, commercial boat docks, motels, sporting goods stores, service stations, boat dealers, restaurants, and many related new businesses.

Construction projects create a temporary influx of workers who spend money in local areas, but at the same time, such projects will create problems of housing, schooling, transportation, and other community services. The solution of these short-term problems should result in long-range gains with construction of facilities that would be needed to meet future expansion.

There are 11 counties out of a total of 27 counties either wholly or partially within the Choctawhatchee-Perdido basins which have been designated redevelopment areas, as of April 1962, by the Area Redevelopment Administration of the U. S. Department of Commerce. Of the 11 counties, 6 are in Alabama, and 5 are in Florida. These counties were so designated for varying reasons such as low median family income and persistent and substantial unemployment or underemployment. Development of the plan for the Choctawhatchee-Perdido basins would assist in the relief of these conditions and aid in raising the economic level of the people. Substantial net secondary benefits are most frequently realized in areas where resource development projects make it possible to utilize unemployed and underemployed labor and unused facilities and resources.

Intangible Benefits

Intangible benefits are those which are not evaluated in monetary terms. Like tangible benefits, these may be primary or secondary in character. Many programs and projects make substantial contributions to public security, to private and public health, and to public safety and tranquility, all of which include large elements of intangible value. Intangible benefits and costs are recognized in programs and projects analyses.

Costs

Costs are the value of labor, goods, and services exchanged to gain goods and services valued more highly. Where the costs are tangible values, the assumption is made that the needs of the project are, in the aggregate, taken from present uses at marginal unit prices and, therefore, the values foregone represent the least important uses that the market would allow. In a resource program as complex as that recommended for the Southeast River Basins, there are also many intangible costs involved.

The costs of proposed projects and programs include the initial investment which would be incurred in one or more stages of construction and the annual expenditures required for operation, maintenance, and replacements. Taxes which would be paid by a private utility were included as a project cost for hydroelectric power projects without regard to whether governmental or private interests would develop the project. Investment costs include the capital expenditures associated with constructing a project and carrying out a program. Where the period of construction was estimated to be more than 2 years, the investment included simple interest on one-half of the construction costs for the period of construction.

Capital investment and operation and maintenance costs of multiple-purpose projects were allocated to the several purposes served so as to form a basis for reimbursement and cost-sharing arrangements that may be required. The procedures used are summarized in Appendix 9, Economics.

Intangible Costs

In evaluating resource projects and programs, many important effects cannot be adequately measured in monetary terms. Loss of scenic values is an example of an intangible cost frequently associated with resource development. Treatment of these intangible effects has been subjected to many of the requirements applicable to tangible effects. These include: (1) Considering effects in terms of difference "with the project" and "without the project" and (2) considering intangible costs to the same degree or extent as intangible benefits.

Cost Sharing

Cost sharing is concerned primarily with the distribution of costs among the participating interests. The division of cost is shown in two groups: Federal and non-Federal. For each specific project or program, the actual division of cost among the Federal and non-Federal interests was determined by the nature of the development and on the basis of circumstances expected to prevail during the evaluation period.

Generally, where the impacts of projects and programs are largely local, the costs are the responsibility of non-Federal interests. Projects and programs of national significance are the responsibility of the Federal Government. Between these two extremes there are a number of projects and programs where the costs are to be shared by the Federal and non-Federal groups.

In determining the degree of Federal participation in projects and programs of less than national significance, consideration was given to: (1) The need for demonstrating new approaches to resource development and use; (2) the usefulness of a local project or program in research and experimentation which has more than local implications; (3) the support of projects or programs which by policy or legislation have become accepted as Federal or part Federal responsibilities, such as flood control; and, (4) the possible justification for Federal participation in the cost of local works and improvements where counties, areas, or regions are designated as distressed and in need of economic assistance.

Financing

Determining effective ways for financing land and water development is an essential part of resource planning. Financing as used here relates to the immediate source of funds needed for construction and management of proposed works. Financing requirements were developed only as Federal and non-Federal although in the analyses, State, county, municipal, and private financing were considered. Special groupings for purposes of financing, such as development corporations and special improvement districts, are also discussed.

The following criteria were used in determining appropriate methods for financing land and water resource developments.

(1) Developments of natural resources that do not involve national consideration will be the responsibility of private, local, and State interests.

(2) Where the costs of projects and programs are to be shared between the Federal and non-Federal interests, each will provide for the financing of its share, except as noted under item (3) following. The Federal share will be provided under such laws and regulations as are applicable at the time of financing. In addition, to direct government and private appropriations for the non-Federal share, development funds, authority funds, special bond issues, and revenue bonds are available for financing.

(3) For projects such as hydroelectric power and water supply, Federal financing may be needed, with provision for reimbursement from non-Federal beneficiaries, as is now practiced. Federal financing may also be required for projects of the types not adequately covered by traditional approaches. This includes large-scale recreation projects and some types of fish and wildlife work.

(4) When the Federal Government assumes the full cost of a project or program, the Federal Government will be responsible for full financing of the work.

SECTION III – PLAN FORMULATION

Selecting and fitting planning segments together and considering alternatives in the search for the proper programs, the proper number of projects, and the best size for each element of

the overall plan required extensive analysis. By a series of approximations using the incremental approach and limited by alternative consideration and judgment, a plan was formulated containing those programs and projects that will usually result in maximum benefits above costs in meeting needs to the year 2000.

General Character of Resource Planning

Generally, resource planning recognizes the consequences of land and water resource development and the need to anticipate the future requirements for land and water essential to growth and welfare. The physical and economic aspects of the planning task have been emphasized, particularly as they relate to the scale, sequence, and timing of development plans. However, these considerations have been tempered by the recognition of social, legal, and political factors.

The plan has been developed on the basis that free enterprise persists in the area and the Nation, with Federal and State Governments undertaking those tasks which are beyond individual or voluntary group capacity or which require such action for special physical, economic, social, or other reasons. Local and regional viewpoints were recognized in formulating the plan.

Guides for Plan Formulation

A number of general land and water resource development guides and planning aids were used in weighing and selecting those alternatives which were fitted into an effective plan. In all cases, the effective use of these guides and planning techniques required careful adherence to the assumptions and criteria outlined in Section II.

Plan Evaluation

Comparison of benefits with costs was one of the principal guides used in plan formulation. These comparisons attempted to cover all beneficial and adverse effects. While favorable primary tangible benefit-cost relations were the principal basis used in selecting programs and projects, intangible costs and benefits were also considered in making the plan. Measurements made reflected existing and probable future economic conditions, including estimates of the probable needs for the many goods and services which land and water development make possible. Benefit-cost data were applied to a range of interdependent physical and social possibilities and the resulting scale used for judging and selecting the means of development, the scope of facilities needed, and the site or area involved.

Increments and the Scale of Development

To achieve a reasonable scale of development, it was necessary in the formulation process to divide the work into manageable units. Planning units, usually called separable segments or increments, were the smallest units on which there was a practical opportunity for inclusion in or omission from the plan.

To meet the general objectives of maximizing net economic returns and satisfactions from the economic resources used in the plan, each part of the plan was formulated to include each separable segment or increment which would provide benefits at least equal to the cost of that segment or increment with full consideration of intangible values. The plan formulation was considered completed when it was demonstrated that (1) there was need for the goods and services produced, (2) each separable segment or purpose provided benefits at least equal to its cost, (3) the scale of total development was such as to provide the maximum net benefits, and (4) there were no more economical means of accomplishing the same purposes.

The Nucleus Plan and the Multiple-Purpose Concept

A specific initial proposal generally was chosen as the nucleus around which planning proceeded. This nucleus usually represented a project or program which seemed to offer promise of meeting a major objective or objectives.

After the initial proposals of development were selected for analysis, and benefits and costs measured, consideration was given to larger or smaller scales of development. Variations in the scope of each separable increment were made and tested and the possibility of additions or omissions examined. Early in this process, the possibility of multiple-purpose projects was considered. By the process of elimination, the most promising combination of projects and programs was identified and tested to determine where a justified nucleus had been found. The incremental analysis was continued by adding seg-

ments of size, purpose, or means, and by evaluating the resulting increments of benefits and costs. Thus, the incremental analysis was a series of comparisons of alternative plans "with" and "without" the inclusion of particular segments. Short cuts were frequent and necessary but these principles were followed. By this fitting process, modifications were made in the initial plan. This process was continued within practical limitations until the best combination was evolved to meet the established needs.

Sequence of Development

The sequence of project development is basic to maximizing overall project benefits. Project benefit and cost comparisons are misleading unless they represent the incremental benefits and costs of projects in a specified sequence of development. This problem was recognized in the studies by dividing proposed developments into those requiring early action and those which could be accomplished by later action. Further refinement in timing could lead to some changes in incremental benefits and costs.

General Information and Basic Data

Some of the general information essential to planning in the basins was available but not always in the most useful form. Much of it required reorganization prior to analysis. While little original research was undertaken, professional interpretation of data and problems was frequently sought in the planning processes. The available data on past and current programs and on resource plans underway by Federal, State, and, to some degree, private agencies became a part of the basic planning information.

A problem repeatedly encountered in the studies was the lack of basic data. Topographic maps with a contour interval of 10 feet are available for about two-thirds of the basins. All of the area is mapped with intervals of 50 feet. Additional basic data on surface water quality is needed. Geological and ground water information is limited to local areas and generalized data. There is an average of about one streamflow gaging station per 500 square miles, with relatively few for small drainage areas or with records going back earlier than 1937. Pertinent economic statistics, except those developed during the last few years, have been less than adequate. The lack of data can be attributed largely to the fact that the basins have never approached full development of their resources. Consequently, there has been minimum effort to collect basic data. However, more competition for resource use is beginning to arise, and selection between uses will be increasingly important as the demands increase. Good basic data are essential to making proper selections, so steps need to be taken promptly to insure that the information will be available when it is critically needed.

Single-Purpose Planning

Single-purpose planning for each purpose was carried to the point of establishing needs and determining most likely ways of meeting the needs with the least expenditure of resources. Studies for some purposes were carried into more detail than others in examining alternative ways of meeting needs. Where it was apparent that a single-purpose plan could be used without major modification in the comprehensive plan, the single-purpose studies were carried to more detail than in those cases where the purpose would be included, with perhaps major modifications, in a multiple-purpose development.

Multiple-Purpose Planning

Information developed in single-purpose planning and the special problems of the area were the initial bases for development of a multiple-purpose plan for the Choctawhatchee-Perdido basins.

The programs and projects which served as nuclei for the intial planning were based on the character of the resources, the nature of the problems, and the nature of the land and water projects already established or planned as portrayed in the single-purpose plans. Proposals considered for the inclusion in the plan came from many sources. Citizens throughout the area and local development organizations expressed interests in projects of many kinds and suggested combinations of resource use and development which they believed would meet particular needs. Federal and State agencies were also the source of much information on possible projects and project combinations.

Consideration was given to complementary land and water uses. Following the development of single-purpose ways for meeting needs, studies of compatible resource uses and areas of potential conflict in resource use were made. It was found that needs for forestry, recreation, and fish and wildlife could frequently be met by proper utilization of the same land resource. Similarly, water resource development plans could acceptably serve the purposes of flood control, hydroelectric power, water supply, fishing, and recreation, although operating adjustments had to be considered so that the most favorable multiple-purpose operating arrangements could be assured to maximize overall net benefits.

When sufficient preliminary study had been made, a series of detailed studies were undertaken to choose from among the alternatives those filling the needs most effectively. In this process, the problem of deciding among competing uses sometimes arose; and there was always present the need to seek arrangements whereby the greatest play of complementary values would occur. This process involved a repetitious series of adjustments, in varying degrees of refinement, combined with progressively refined economic, hydrologic, and engineering comparison, until the best combination of proposed developments was found.

Nature and Treatment of Alternatives

In resources planning, comparison of alternatives is a vital part of the planning process. It is necessary to understand the nature of projects and programs rejected and the reasons for rejection, as well as the character of those accepted in the plan. Information on alternatives considered is summarized in Part Four. Additional details concerning the nature of the alternatives considered and the reasons for their acceptance or rejection in the final plan are included in Appendix 12, Planning.

Competitive Uses

Many resource uses are competitive in character. The principal guidelines established and generally followed in determining the use of land and water resources are summarized as follows: (1) Resource utilization was based on and limited to the projected future needs; and (2) economic efficiency was a major governing criterion in deciding between alternative uses of a given resource, with due consideration given to social, political, and physical factors. Some of the situations requiring special attention are: (1) Existing, reserved, or special use land and water resources; (2) public health; (3) special requirements involving areas that provide a particular type of land or water use that cannot be duplicated elsewhere at a reasonable cost; and (4) those resources to which priority considerations should be given because of long established or firmly fixed development trends.

Adjustment Among Basins in Planning

Interbasin relations were recognized, to the extent practicable, when Southeast River Basins needs were developed and distributed among basins to provide planning objectives for each basin. For example, user-days of recreation demand for a given population center were distributed to all basins within reasonable travel distance from the center, considering likely travel routes, rather than being allocated exclusively to the basin within which the center lies. A check was made to insure that the overall cost of meeting each need was not inflated by unreasonable disparities in unit costs. Adjustments between the Choctawhatchee-Perdido and other basins were made where reasonable alternatives were available and where overall efficiencies could be improved by the adjustments.

PART FOUR – BASINS PLAN

SECTION I – COMPREHENSIVE BASINS PLAN

The comprehensive plan for the development, conservation, and utilization of the land and water resources of the Choctawhatchee-Perdido basins is comprised of projects and programs to meet the needs of the basins projected to the year 2000. Projects and programs included in the plan in addition to those in existence in 1960 are shown in Tables 4.1 and 4.2. More detailed data pertinent to project and program accomplishments, plans by purposes, economic analyses, physical features, and implementation of the plan are included in subsequent Sections.

The plan includes continuing programs such as those for public health and soil conservation

TABLE 4.1

Comprehensive Plan for Development
(thousands of dollars)

Project or program	Purpose[1]	Benefits[2]	Costs		
		Annual equivalent	Annual equivalent		Investment
			Total	Operation, maintenance, and replacements	
Ariton	FC, R, F&W	868	451	107	9,644
Crestview	P, R, F&W	3,939	2,229	480	39,520
Deadening Lakes	R. F&W	3,024	1,184	620	15,660
Fishing lakes	R, F&W	232	80	56	759
Water-access areas	R, F&W	4,773	1,239	779	12,720
Upstream watersheds	FC, D	127	99	29	1,949
Brewton levee	FC	29	27	2	684
Flomaton levee	FC	45	27	5	619
Port St. Joe Harbor	N	1,665	1,442	1,140	6,300
Panama City Harbor	N	1,690	1,438	1,150	6,030
Pensacola Harbor	N	397	269	188	2,221
Gulf County Canal	N	48	41	22	539
Perdido Pass	N	97	71	20	1,400
Water supplies	WS	[3]	12,340	9,682	118,700
Irrigation	I	558	260	215	1,258
Drainage[4]	D	141	23	16	188
Soil conservation	SC	3,747	2,818	1,882	25,900
Forest conservation	F	7,402	3,866	1,562	100,100
Fish and wildlife[4]	F&W	6,582	2,599	2,444	7,012
Recreation[4]	R	17,600	5,880	3,506	102,700
Pollution abatement	PA	[6]	5,327	1,220	175,900
Public health[5]	PH	[6]	2,003	1,956	2,300

NOTES: [1] FC – Flood control; WS – Water supplies; N – Navigation; D – Drainage; I – Irrigation; P – Hydroelectric power; SC – Soil conservation; F – Forest conservation; F&W – Fish and wildlife; R – Recreation; PA – Pollution abatement; PH – Public health

[2] Primary tangible only; intangible and secondary benefits and impacts considered are presented in narrative.
[3] Benefits are assumed to be at least equal to the cost of the cheapest alternative project but are not evaluated in monetary terms.
[4] Data presented are exclusive of benefits and costs associated with multiple-purpose projects.
[5] These are annual operation programs and do not have any investment costs except those for incinerators.
[6] Justification is based largely on intangible benefits.

CHOCTAWHATCHEE-PERDIDO BASINS PLAN FEATURES

(key to numbers shown on Figure 4.1)

1 Crenshaw County Recreation Area
2 Pike County Public Lake
3 Butler County Wildlife Management Area
4 Crenshaw County Public Lake
5 Pike County Public Lake
6 Pike County Recreation Area
7 Ariton Reservoir
8 Coffee County Public Lake
9 Dale County Public Lake
10 Fort Rucker Wildlife Management Area
11 Conecuh County Public Lake
12 Conecuh County Recreation Area
13 Mitchell Archeological Site
14 Covington County Recreation Area
15 Geneva State Forest Recreation Area
16 Geneva County Public Lake
17 Escambia County Recreation Areas (2)
18 Brewton Levee
19 Blue Springs Wildlife Management Area
20 Covington County Wildlife Management Area
21 Geneva County Public Lake
22 Flomaton Levee
23 Conecuh National Forest Recreation Area
24 Geneva State Forest Wildlife Management Area
25 Geneva County Recreation Area
26 Blackwater River State Forest Recreation Area
27 Shoal River Wildlife Management Area
28 Perdido River Wildlife Management Area
29 Walton County Recreation Area
30 Holmes County Recreation Area
31 Baldwin County Recreation Area
32 Escambia River Wildlife Management Area
33 Santa Rosa County Recreation Area
34 Blackwater Wildlife Management Area
35 Crestview Reservoir
36 Morrison Springs Recreation Area
37 Falling Waters Recreation Area
38 Eglin Air Force Base Wildlife Management Area
39 Fort Walton Archeological Site
40 Econfina Creek Reservoir—Deadening Lakes Project
41 Pine Log State Forest Wildlife Management Area
42 Pine Log State Forest Recreation Area
43 Bear Point Archeological Site
44 Pensacola Bay Forts
45 Pensacola Harbor and Port Improvement
46 Naval Live Oak Recreation Area
47 Point Washington Wildlife Management Area
48 Roy S. Gaskin Wildlife Management Area
49 Panama City Harbor and Port Improvement
50 Tyndall Air Force Base Wildlife Management Area
51 Gulf County Canal Improvement
52 Alabama Beaches Recreation Areas
53 Perdido Pass Channel Improvement
54 Gulf Beach Recreation Area
55 Fort Pickens State Park Recreation Area
56 Pensacola Beach Recreation Area
57 Santa Rosa Island Beach Recreation Area
58 Okaloosa County Beach Recreation Area
59 John C. Beasley State Park Recreation Area
60 Walton County Beaches Recreation Areas
61 West Bay County Beaches Recreation Areas
62 St. Andrew State Park Recreation Area
63 East Bay County Beaches Recreation Areas
64 Gulf County Beaches Recreation Areas
65 Port St. Joe Harbor and Port Improvement

CHOCTAWHATCHEE-PERDIDO BASINS PLAN

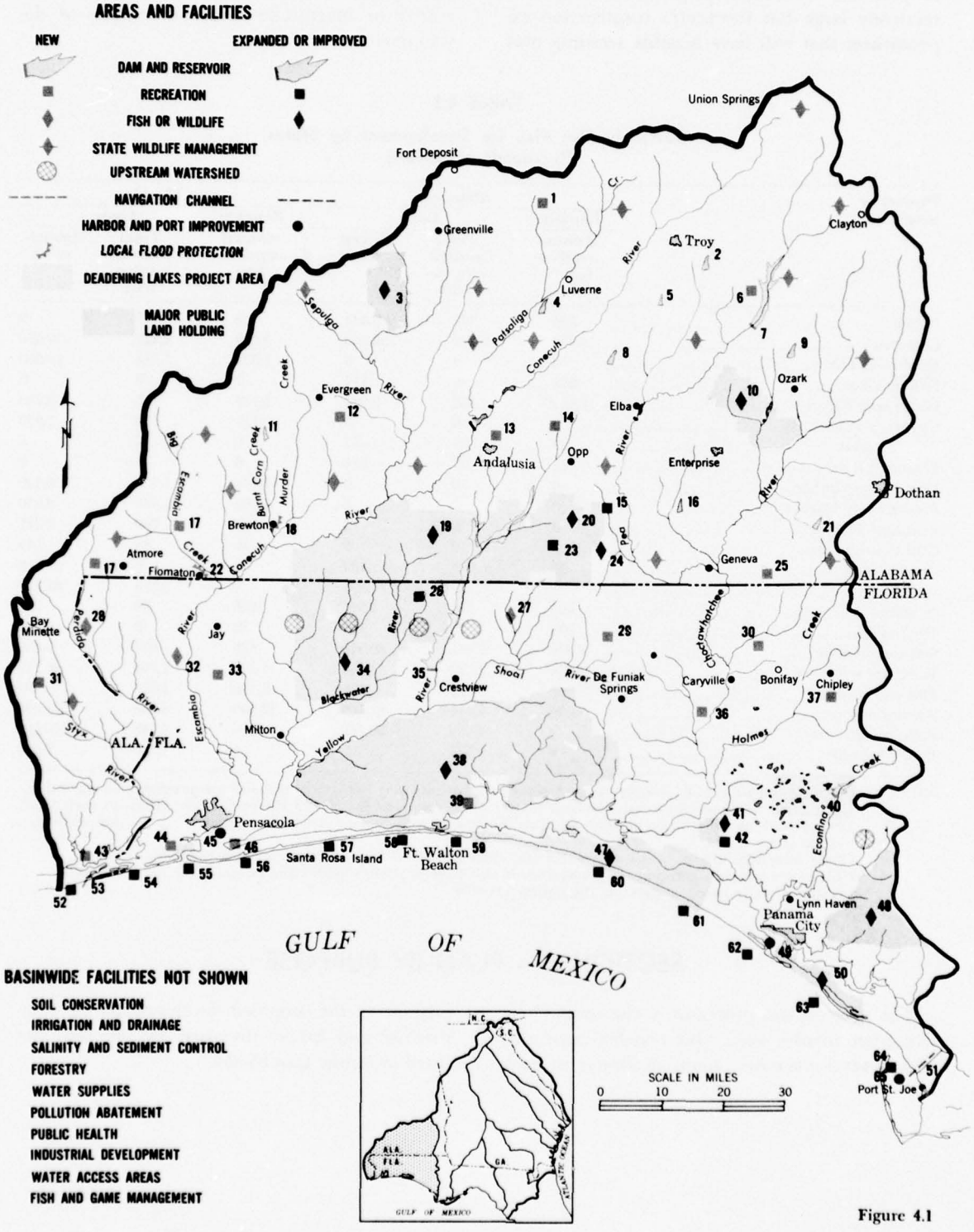


Figure 4.1

and utilization that are carried on from year to year and individual projects which involve relatively large but short-term construction expenditures that will have benefits accruing over many years. Some of the programs are already underway and the expected changes involve intensity or magnitude rather than type of development.

TABLE 4.2

Comprehensive Plan for Development by States
(thousands of dollars)

Project or program	Alabama			Florida		
	Benefits[1]	Costs		Benefits[1]	Costs	
	Annual equivalent	Total annual equivalent	Investment	Annual equivalent	Total annual equivalent	Investment
Ariton	868	451	9,644	0	0	0
Crestview[2]	3,939	2,229	39,520	3,939	2,229	39,520
Deadening Lakes	0	0	0	3,024	1,184	15,660
Fishing lakes	232	80	759	0	0	0
Water-access areas	1,034	282	2,962	3,739	957	9,758
Upstream watersheds	0	0	0	127	99	1,949
Brewton levee	29	27	684	0	0	0
Flomaton levee	45	27	619	0	0	0
Port St. Joe Harbor	0	0	0	1,665	1,442	6,300
Panama City Harbor	0	0	0	1,690	1,438	6,030
Pensacola Harbor	0	0	0	397	269	2,221
Gulf County Canal	0	0	0	48	41	539
Perdido Pass	97	71	1,400	0	0	0
Water supplies	[3]	2,570	26,570	[3]	9,770	92,130
Irrigation	454	214	1,035	104	46	223
Drainage[4]	109	15	143	32	8	45
Soil conservation	2,924	2,181	20,010	823	637	5,890
Forest conservation	3,938	2,120	53,850	3,464	1,746	46,250
Fish and wildlife[4]	1,142	675	515	5,440	1,924	6,497
Recreation[4]	5,000	1,614	27,100	12,600	4,266	75,600
Pollution abatement	[6]	1,079	29,300	[6]	4,248	146,600
Public health[5]	[6]	717	—	[6]	1,286	2,300

NOTES: [1] Primary tangible only; intangible and secondary benefits and impacts considered are presented in narrative.
[2] The reservoir would be located in both States. Total costs and benefits of the project are shown in each State.
[3] Benefits are assumed to be at least equal to the cost of the cheapest alternative project but are not evaluated in monetary terms.
[4] Data presented are exclusive of benefits and costs associated with multiple-purpose projects.
[5] These are annual operation programs and do not have any investment costs except those for incinerators.
[6] Justification is based largely on intangible benefits.

SECTION II – PLAN BY PURPOSE

The projects and programs in the comprehensive plan involve costs and benefits associated with several purposes. Items pertinent to each purpose in the proposed developments are summarized and briefly discussed by the purposes listed in Public Law 85-850.

TABLE 4.3
Plan by Purpose
(thousands of dollars)

Purpose	Benefits	Costs		
	Annual equivalent[1]	Annual equivalent		Investment
		Total	Operation, maintenance, and replacements	
Flood control	528	301	48	7,026
Water supplies	[2]	12,340	9,682	118,700
Navigation	3,897	3,261	2,520	16,490
Reclamation, irrigation, and drainage	762	331	245	2,407
Hydroelectric power and industrial development	1,154	1,123	131	18,080
Soil conservation	3,747	2,818	1,882	25,900
Forest conservation	7,402	3,866	1,562	100,100
Fish and wildlife	7,648	3,446	2,703	23,350
Recreation	27,826	8,897	5,132	141,850
Salinity and sediment control	[3]	[3]	[3]	[3]
Pollution abatement and public health	[4]	7,330	3,176	178,200
Other beneficial purposes[5]	---	---	---	---

NOTES: [1] Primary tangible only; intangible and secondary benefits and impacts considered are presented in narrative.
[2] Benefits are assumed to be at least equal to the cost of the cheapest alternative project but are not evaluated in monetary terms.
[3] Included with soil conservation, forest conservation, and flood control.
[4] Justification is based largely on intangible benefits.
[5] Additional studies necessary for beach erosion control and hurricane protection, but no regular program is included in the plan.

Flood Control and Prevention

Flood control is one of the principal purposes of the Ariton reservoir, a large impoundment that would regulate floodflow and benefit Elba and Geneva, Alabama, and Caryville, Florida. Local protection works included in the plan are for two locations in the Alabama portion of the basins. Flood protection is one of the purposes served by upstream watershed projects. Flood protection for woodland is included in the forestry program.

TABLE 4.4
Flood Control Benefits and Costs
(thousands of dollars)

Project or program	Benefits	Costs		
	Annual equivalent	Annual equivalent		Investment
		Total	Operation, maintenance, and replacements	
Ariton*	390	196	26	4,735
Brewton levee	29	27	2	684
Flomaton levee	45	27	5	619
Upstream watersheds*	64	51	15	988
Total	528	301	48	7,026

* Flood control benefits and allocated costs only.

Water Supplies

The water supply program proposed for installation to the year 2000 includes additional and improved supplies for domestic, municipal, and industrial uses. The domestic water supply program includes new drilled wells, sealing and covering of existing wells, and power pumps and pressure systems. The program would serve about 226,900 people and would provide about 22.7 million gallons of water per day. The municipal water supply program includes source treatment, elevated storage, and enlarged distribution systems. About 1,291,000 persons requiring 258 million gallons per day would be served by the program. Water supply needs for the Federal and non-Federal institution installations in the basins for which no population growth was estimated were not considered in developing the program.

The industrial water supply program includes new sources of supply, additional treatment plants, increased storage, and other water-handling equipment. Industrial water requirements of 769 million gallons per day would be provided.

The benefits from providing a suitable water supply are assumed to equal or exceed the costs

of obtaining, from the cheapest and most likely alternative source, a supply that is adequate in quantity and quality. In these basins, ground water sources are generally the most likely alternative because of adequately yielding aquifers that are accessible at fairly shallow depths.

TABLE 4.5

Water Supplies Costs
(thousands of dollars)

Project or program	Costs		
	Annual equivalent		Investment
	Total	Operation, maintenance, and replacements	
Domestic	469	173	9,900
Municipal	7,168	5,372	82,400
Industrial	4,703	4,137	26,400
Total	12,340	9,682	118,700

Navigation

The navigation developments proposed include channel improvements, harbor improvements at the deep-water ports, and additional terminal facilities. Channel improvements are from Perdido Bay to the Gulf via Perdido Pass and from the Intracoastal Waterway to St. Joseph Bay via the Gulf County Canal. Port improvements include modifying the existing harbor facilities and extension of the terminal facilities of Port St. Joe, Panama City, and Pensacola, Florida.

TABLE 4.6

Navigation Benefits and Costs
(thousands of dollars)

Project or program	Benefits	Costs		
	Annual equivalent	Annual equivalent		Investment
		Total	Operation, maintenance, and replacements	
Port St. Joe Harbor*	1,665	1,442	1,140	6,300
Panama City Harbor*	1,690	1,438	1,150	6,030
Pensacola Harbor*	397	269	188	2,221
Gulf County Canal*	48	41	22	539
Perdido Pass	97	71	20	1,400
Total	3,897	3,261	2,520	16,490

* Benefits and costs are in addition to those associated with existing facilities.

Reclamation, Irrigation, and Drainage

In this Appendix, reclamation and drainage are considered synonymous. Most of the irrigation and drainage included in the plan involves individual or group actions by the farm owners or operators. Irrigation of about 10,000 acres of additional cropland and drainage of about 250,000 acres of cropland, pastureland, woodland, and other land are included in the plan. In addition, the plan incorporates upstream watershed projects in drainage areas totaling about 900,000 acres to provide for drainage in combination with flood prevention. Woodland drainage is included in the forestry program.

TABLE 4.7

Irrigation and Drainage Benefits and Costs
(thousands of dollars)

Project or program	Benefits	Costs		
	Annual equivalent	Annual equivalent		Investment
		Total	Operation, maintenance, and replacements	
Irrigation	[1]558	260	215	1,258
Drainage				
Individual farm	[1]141	23	16	188
Upstream watersheds[2]	63	48	14	961
Subtotal	204	71	30	1,149
Total	762	331	245	2,407

NOTES: [1] Annual returns to farmers.
[2] Drainage benefits and allocated costs only.

Hydroelectric Power and Industrial Development

The proposed Crestview dam and reservoir on the Yellow River includes a hydroelectric powerplant with an installed capacity of 47,000 kilowatts capable of generating about 53 million kilowatt-hours annually. Annual equivalent benefits of power from this project are estimated to be $1,154,000. Annual equivalent costs allocated to the power features are estimated at $1,123,000, including operation, maintenance, and replacements costs of $131,000 and taxes foregone of $339,000. The investment costs allocated to power are estimated to be $18,080,000.

Industrial development is expected to increase in the basins and be enhanced by the resources development plan including the provision for

hydroelectric power. Manufacturing employment projections for the basins show increases in all manufacturing categories by 2000 except textiles. Industries expected to have the greatest increases are apparel, pulp and paper, metal processing, and chemical.

Soil Conservation and Utilization

The plan includes land treatment for about 941,000 acres of cropland, pastureland, and rangeland by soil conservation measures and practices. It also makes an allowance for expected land-use conversions and the installation of about 6,900 additional farm ponds. Annual returns to the individual farmers for soil conservation and land-use conversions are expected to be $3,747,000. Annual equivalent costs are estimated to be $2,818,000, of which $1,882,000 are for operation, maintenance, and replacements costs. It is estimated that investment costs will be $25,900,000.

Forest Conservation and Utilization

The forestry program is mainly developed, financed, and administered by the landowners, with technical assistance from Federal agencies and some Federal participation in fire prevention and other aspects of the program. The program for the 6,629,000 acres of woodland in the basins by the year 2000 includes woodland drainage and water control, in addition to fire protection, grazing control, tree planting, forest road installations, timber-stand improvement, and other measures. The program would provide for an annual timber cut of 361 million cubic feet by year 2000 and about 1.63 million faces for gum-naval stores production.

Annual equivalent benefits of the program are expected to be $7,402,000. The estimated annual equivalent costs are $3,866,000, of which operation, maintenance, and replacements costs total $1,562,000. The projected investment costs of the program are $100,100,000.

Fish and Wildlife

The fish and wildlife program extends throughout the basins. It is primarily one for local and State development, but some Federal assistance would be provided under existing law.

The program includes the fish and wildlife features of the Ariton, Crestview, and Deadening Lakes projects, the latter involving diversion of water from Econfina Creek for stabilizing lake levels in the Deadening Lakes. Fish and wildlife facilities are included in 70 water-access areas in Alabama and Florida and 3 new fishing lakes in Alabama.

The wildlife program includes improvement of some 469,000 acres of State administered areas, 84,000 acres in the Conecuh National Forest, and about 500,000 acres of military area; development of new management areas totaling 690,000

TABLE 4.8

Fish and Wildlife Benefits and Costs
(thousands of dollars)

Project or program	Benefits	Costs		
	Annual equivalent	Annual equivalent		Investment
		Total	Operation, maintenance, and replacements	
Ariton[1]	80	44	5	1,089
Crestview[1]	691	554	84	13,020
Deadening Lakes[1]	164	163	109	1,500
Fishing lakes[1 2]	61	18	17	29
Water-access areas[1]	70	68	44	700
Single-purpose programs				
Sport fisheries and wildlife	5,725	2,261	2,110	6,842
Commercial fisheries	857	338	334	170
Total	7,648	3,446	2,703	23,350

NOTES: [1] Fish and wildlife benefits and allocated costs only.
[2] Benefits and costs are included for three new fishing lakes.

acres of State administered area, 4,100 acres of dove fields, and 10,000 acres of coastal wetlands; and extensive habitat development. The sport fishing program includes the preservation and development of river areas, the renovation and more intensive management of existing and new large and small impoundments, and the installation of 42 fishing reefs and 10 fishing piers.

The commercial fisheries program includes expansion of existing operations, rehabilitation of oyster reefs, cultivation of high-quality seafoods, and acceleration and expansion of existing facilities and activities to provide an annual catch by the year 2000 of 23.9 million pounds. The 1960-2000 program provides an increase of 12.6 million pounds.

These programs by the year 2000 provide annually for some 1.8 million user-days of hunting and about 8.7 million user-days of sport fishing. The sport fishing program falls about 0.5 million user-days short of meeting the expected demand by the year 2000.

The 1960-2000 program summarized above would provide 1,179,000 user-days of hunting including 10,000 user-days to offset net losses in the multiple-purpose developments. The program also provides an additional 6,360,000 user-days of sport fishing.

Recreation

Continuation of the development of beaches along the coast; expansion of facilities in the national and State forests; the construction of facilities at natural and historical locations; development of facilities at 5 existing fishing lakes; plus single-purpose developments at 2 water-access areas and multiple-purpose developments at 40 water-access areas, 3 new fishing lakes, and 3 large reservoirs provide a well-balanced program to meet future recreation needs.

The proposed and existing facilities included in the plan would provide for a projected need of 46 million user-days by the year 2000. Development of existing and new facilities would accommodate about 32,960,000 user-days at beaches on the Gulf coast and 13,040,000 user-days at general outdoor areas, natural environment areas, impoundments, and cultural areas.

Projects and programs for recreation development during the period 1960-2000 would provide for 39,950,000 user-days, including 29,010,000 user-days with expanded facilities over those existing in 1960 and 10,940,000 user-days at new areas.

Salinity and Sediment Control

Neither salinity nor sediment are major problems in the Choctawhatchee-Perdido basins, and no programs or projects are proposed exclusively for their control. There would be some benefit to sediment control as a result of the soil conservation and forestry programs, but the benefits have not been evaluated separately.

TABLE 4.9
Recreation Benefits and Costs
(thousands of dollars)

Project or program	Benefits	Costs		
	Annual equivalent	Annual equivalent		Investment
		Total	OM&R	
Ariton[1]	398	211	76	3,820
Crestview[1]	2,094	552	265	8,420
Deading Lakes[1]	2,860	1,021	511	14,160
Fishing lakes[1] [2]	171	62	39	730
Water-access areas[1]	4,703	1,171	735	12,020
Single-purpose recreation				
Improvement of existing areas	14,660	4,710	2,858	85,700
New developments	2,940	1,170	648	17,000
Total	27,826	8,897	5,132	141,850

NOTES: [1] Recreation benefits and allocated costs only.
[2] Benefits and costs are included for five existing and three new fishing lakes.

Pollution Abatement and Public Health

The program for pollution abatement consists of new and extended sewerage systems for approximately 1,284,000 persons. By the year 2000, there is expected to be 23 primary plants, 84 secondary plants including stabilization ponds, and new sewerage systems or extensions to existing sewerage systems serving 107 places. Sewerage facility needs for the 13 Federal and non-Federal institutional installations in the basins for which no population growth was estimated were not considered in developing the program.

The public health program consists of drainage and spraying for vector control, 4 incinerators for solid-waste disposal, sanitary landfill at 88 places for fly and rodent control, and continuation of statewide programs for air pollution and radiation monitoring. The health aspect of other projects and programs relate to the prevention of hazards to health and these costs are, therefore, included in the other purpose costs. These pollution abatement and public health programs are expected to contribute to the general health and welfare of residents, tourists, and vacationists, including fishermen and hunters.

Tangible benefits were not evaluated but assumed at least equal to costs. Justification was based on intangibles.

TABLE 4.10

Pollution Abatement and Public Health Costs (thousands of dollars)

Project or program	Costs		
	Annual equivalent		Investment
	Total	OM&R	
Pollution abatement	5,327	1,220	175,900
Public health	2,003	1,956	2,300
Total	7,330	3,176	178,200

Other Beneficial Purposes

There are beach erosion and hurricane damage problems in the basins. These are expected to increase as coastal areas develop. The plan provides for existing hurricane-warning systems to continue to be improved and proposes studies of beach erosion control and hurricane protection possibilities. Also provided are programs for obtaining topographic and geologic mapping, hydrologic data, data on water quality and water use, and on land-use changes to improve and add to the store of basic data on the area resources.

The forecasting of streamflow is essential in the proper management of water resources. Flood forecasting is well known for reservoir operation and for warnings in areas unprotected by physical control of floodwater. Future use and regulation of streams will require forecasts of flow, both high and low, as far in advance as is practicable. All river-related purposes, such as recreational boating and fishing, navigation, hydropower operation, water supply, pollution abatement, public health, irrigation, and flood control, are benefited by advance information as to the expected flows. The costs of forecasting are relatively small and are included in the overall project and program costs. The benefits are also included in the assumption that the best possible forecasts will be available. These benefits are not achieved automatically. A deliberate program which recognizes the necessary lead time for development of reporting network and other facilities is required.

SECTION III – IMPACTS OF THE PLAN

Economic

A major objective of the plan is to improve the environment of the basins for people and industry. These improvements are not all measureable in tangible terms. Identifiable primary tangible benefits have been used for evaluation of the projects and programs in this plan. The greater use and greater value, however, might very well stem from benefits not identified or fully recognized in the monetary justification. These nonevaluated benefits may be either or both primary and secondary in nature.

The impact of programs and projects which involve increased production of commodities

would be felt in the general community by requiring additional production materials and processing equipment and more services to provide the material, maintain the equipment, and to sustain its operation. These increased activities would stimulate a large exchange of money throughout the basins. Similarly, it is expected there would be very sizeable impacts from recreation and sport fishing and wildlife projects and programs. Fishing camps, motels, sporting goods stores, service stations, boat dealers, restaurants, and related new businesses would be required.

Development of the land and water resources in the Choctawhatchee-Perdido basins could stimulate economic development that could reach beyond the basins limits. Some of the more significant impacts, for each purpose served by the plan of development, are discussed in the following paragraphs.

Flood Control

Flood damage in the Choctawhatchee-Perdido basins has, in the past, been quite serious. Damage has been largely to crops and farm property. Some urban damage has occurred in Brewton and Flomaton, Alabama, and in several other communities in Alabama and Florida. However, most flood damages can be prevented in the future through flood plain management including zoning, flood forecasting, and construction of flood control facilities in local areas and in the upstream watershed areas.

The benefits from flood control are generally reflected in the prevention of loss of goods or services and in the increase in the production of goods and services through more intensive use of real property. Where flood plain management embracing zoning is the primary control plan, wiser use of the real property would result and wiser use of the flood plains would mean savings in property losses.

Water Supplies

The benefits from water supplies are considered equal to the cost of obtaining water of similar quantity and quality from the cheapest and most likely alternative source. In these basins, the principal artesian aquifer produces water that is of good quality and exceptional quantity and is accessible at relatively low cost.

The present availability of water should not diminish its value and benefit. Water availability governs all human activity. The availability of good quality water in ample supplies determines to a considerable extent the degree of community and industrial development. Availability of water can start or continue an expansion that will result in great economic benefits to any locality. Therefore, the value of water in the basins as a natural resource should be considered as much greater than the cost of obtaining it today.

Navigation

Navigation projects proposed for the basins are harbor improvements and expanded terminal facilities of the three deep-water ports and channel improvements to Perdido Pass and the Gulf County Canal. The Perdido Pass project will provide a small-craft outlet from the Perdido River to the Gulf. This will offer benefits to the commercial fishing interests in the area and will lessen catch spoilage and craft damage. The economic effects beyond these benefits include recreational benefits.

The deepening and widening of the Gulf County Canal would enable craft and barges using the Gulf Intracoastal Waterway to come directly into Port St. Joe Harbor. The economic impacts of waterway navigation projects would stem from the primary benefits of savings in transportation costs (1) to existing traffic not now using the waterway and (2) to potential traffic expected to develop because of the waterway.

In the case of harbor improvements to Port St. Joe, Panama City, and Pensacola Harbors, the impacts would stem (1) from elimination of lost time in handling cargo, (2) from elimination of ship damage, and (3) from protection from storms. All of these benefits may give rise to economic development and economic impacts.

Industries that supply or consume large amounts of bulk commodities suitable for water transport generally find it advantageous and profitable to locate on navigable intracoastal waterways or adjacent to improved harbors. These improved waterways or harbors become parts of mass-production lines for moving bulk materials and component parts or finished commodities at low cost. The petroleum, petrochem-

ical, and chemical industries are examples of this in the Choctawhatchee-Perdido basins. If other factors such as raw materials, markets, land transportation, power, and suitable sites are favorable, industrial development could very well be an outgrowth of waterway or harbor improvement. It is in this subsequent development that the real economic impacts are found.

Irrigation, Drainage, Flood Prevention, and Soil Conservation and Utilization

Agricultural employment is an important factor in the economy of the Alabama portion of the basins, amounting to over 21 percent of the total employment in the Alabama portion. In the Florida portion, agricultural employment represents only 6.5 percent. Agricultural employment in the basins is projected to decline by 41 percent over the next 40 years, but production is expected to increase considerably. Crops such as cotton, tobacco, peanuts, corn and small grain, and nearly all livestock production is projected to increase more than twofold. At the same time, acreage utilized for crops is expected to remain fairly stable, and pasture acreage is expected to increase only slightly. Agriculture is expected to have a greater effect on the basins economy in the future although directly employing fewer people than in 1960.

In 1959, the net income from agriculture, including farm forestry, was over $17 million. By 2000, it should be over $71 million. It has been estimated that for every dollar of net income derived from primary industries, including agriculture and recreation, there is at least an additional $1.25 to $1.50 income generated in the local economy.

By 2000, annual production expenditures are expected to exceed $175 million. It is estimated the basins farmers will spend $28.5 million for feed, $8.3 million for livestock, $5.7 million for seed, $27.8 million for fertilizer and lime, $29.9 million for repairs and maintenance, $22.9 million for labor, $3.7 million for interest on mortgages, and $49.0 million for other items. Supporting retail, wholesale, service, and financial activities will be affected greatly by these expenditures.

Only the portion of the total agricultural program which involves soil conservation and utilization, reclamation, drainage, irrigation, and upstream watershed improvements is included in this plan. The benefits, primary and secondary, from these programs are expected to create a portion of the economic impacts of the total agricultural program. They, like the impacts from other aspects of the agricultural program, are expected to have real and lasting effects on the basins communities. Benefits would accrue through improved efficiencies of farm operations; reduction of turbidity of many streams; prolongation of the useful life of storage reservoirs; some alleviation of flood and sediment damage to roads, bridges, roadfills, livestock, and real and personal property; improved wildlife habitat and recreation facilities; and abatement of stream pollution. These programs also facilitate proper utilization of agricultural lands by protecting land from erosion, permitting more intensive utilization, and contributing toward an adequate agricultural and nonagricultural water supply for the people of the basins.

As a source of raw materials to sustain the food processing industries, agriculture also is expected to hold great importance. Secondary benefits from agricultural development would have real and lasting effects on the communities of the basins.

Hydroelectric Power and Industrial Development

Development of hydroelectric power is proposed in the Crestview project. The economic effects of this project are discussed later in Part Four. Most of the power needs of the basins will continue to be served by other types of power generating plants or by imported power. Additional facilities could be constructed by private power companies, including steam-powered plants using the available water supply for cooling.

Manufacturing employment projections for the basins show manufacturing employment more than doubling by 2000. All industrial categories should show an increase except textiles. Industries that show promise of greatest increase are apparels, pulp and paper, and metal processing. Chemicals should also increase substantially.

Capital expenditures for industrial expansion anticipated in the basins should average about

$15.5 million per year. On the average, 1,300 new jobs annually are expected to be created in manufacturing; and approximately 7,000 new jobs per year should be forthcoming in trades, services, and professional categories.

New manufacturing employees and those in supporting industries, services, professions, and trades will buy new homes, cars, furniture, appliances, food, drugs, and services. They will also pay taxes and demand governmental services for their tax dollar. So with economic progress comes community demands for services. This means demands for highways, water, sewerage systems, and protection. Communities that keep abreast or even ahead of these demands are the communities that are going to realize the fastest growth.

The economic impact of industry does not stop when it reaches the city limits nor even the basins boundaries. Its effects are far reaching with the larger trading centers feeling the greatest results of this activity.

Forest Conservation and Utilization

Most of the land area of the Choctawhatchee-Perdido basins has always been in timber. Lumber interests harvested most of the original timber in the late 1800's. Today, mostly by regeneration processes, nearly three-fourths of the basins area is still in woodland, with 99 percent of the woodland classed as commercial. Nearly 60 percent of the forest land is in private nonfarm holdings. Timber acreage in the basins is expected to decline in the next 40 years while timber production is projected to more than double.

The increased timber production is of great importance to the basins because of the raw materials needed to advance the manufacturing potential. The pulp and paper industries are expected to more than double in employment by 2000 and the lumber and wood products industries should make substantial gains. Also, the chemical industries, a segment of which utilizes naval stores products, should also show substantial increases. Increased employment should be forthcoming from reforestation, management, and fire protection as well as the harvesting and transporting of the timber products and raw materials. All of these activities can be of great importance to the smaller, rural communities, many of which were originally founded on a timber-producing economy. These activities mean increased expenditures for equipment, supplies, taxes, services, payrolls, and housing.

In addition, the forestry program would improve the condition of the soil and reduce erosion and storm runoff. Recreation possibilities would be enhanced and better fish and wildlife habitat would be provided.

Fish and Wildlife

The expenditures of sportsmen in the project areas as well as in the towns or cities where they reside would add much to the basins economy. Additional employment opportunity would be afforded by many small businesses engaged in boat building and supplies, operation of fishing and hunting camps, and in services and sales of food, gasoline, arms and ammunition, fishing tackle, live bait, and other sporting goods and supplies.

Benefits that are less tangible are derived from general enhancement of the recreational opportunities afforded by a given locality. The growth of many towns and cities in the Southeast River Basins will depend to a great extent on their attractiveness and proximity to lands and waters affording good hunting and fishing.

Table 4.11 summarizes the percentage distribution of expenditures which could be expected from hunting and fishing in the basins. These are compiled from national averages and are only illustrative. The rate of expenditure varies widely from a few cents per day for the local hunter and fisherman to $100 per day in some instances for the vacationing sportsman. National averages approximate $6 per day.

TABLE 4.11

Percentage Distribution of Expenditures Hunting and Fishing – 1960

Expenditure item	Fishing	Hunting
Food	7	8
Lodging	2	2
Transportation	15	14
Equipment	49	48
Licenses, tags, permits	5	2
Leases, fees, other	22	26
Total	100	100

With the Choctawhatchee-Perdido basins fronting on the Gulf of Mexico and its many bays and tidal tributaries, the commercial fishing potential of the basins is excellent. The program would create an increase in production of fish, crabs, oysters, and shrimp. Not only should this new production be utilized in food processing industries, creating an increase in employment, but also other elements of the industry would be affected, too, such as boat building and supplies. The Perdido Pass project could enhance the commercial fishing potential. The commercial fishing industry is expected to gain in importance in the economy of the Choctawhatchee-Perdido basins.

Recreation

Recreation activities create economic stability in many areas including most of the coastal area of the Choctawhatchee-Perdido basins, known in Florida as the "Miracle Strip." Several segments of manufacturing industry such as boat building and recreation and camping equipment that are wholly dependent upon outdoor recreation pursuits have evidenced phenomenal growth in the Nation in the last decade. This trend is expected to continue as leisure time and per capita income increase.

Outdoor recreation produces many primary benefits. Some of these benefits are not of a purely economic nature. Recreation provides the healthful exercise necessary for physical fitness. It promotes mental health and offers esthetic values.

Recreation produces secondary benefits that are reflected in the economy of the area, the community, and the Nation. These benefits are:

(1) Stimulation of travel and travel expenditures.

(2) Development of business activity in areas within, adjacent to, or on routes approaching the recreation area, thereby increasing retail trade and new construction.

(3) Stimulation of business activity relative to the manufacture of recreation equipment.

(4) Increased property valuations in and around recreation areas.

(5) Increased miscellaneous net tax revenue.

Surveys have been made in many areas, but the effectiveness of these surveys is dependent upon how they were developed and for what purpose. Some of the surveys give individual expenditure estimates ranging from $4 to $7 per day and tabulate expenditures for food, lodging, and transportation. A recent Georgia survey determined that about $4 is spent daily by the recreationist. These expenditures are reflected in the economic activities mentioned above. Even if this rate does not increase in the next 40 years, the 46 million recreationists expected to use the Choctawhatchee-Perdido basins annually by 2000 would be spending over $184 million. This is nearly double the present recreation expenditures for the entire Southeast River Basins and 10 times the present expenditures for recreation in the Choctawhatchee-Perdido basins.

Water-based recreation is of special importance to outdoor recreation. Reservoirs, lakes, unpolluted streams, and gulf and ocean beaches generate more recreational activity than any other recreation factor. A recent 10-year study of selected counties in the Arkansas-White-Red River Basins with significant reservoir shorelines showed an increase in per capita income of 57 percent, an increase in bank deposits of 57 percent, and an increase in tax levies of 64 percent. Also significant was an increase in investment in overnight lodging facilities, annual expenditure on private home construction, and new school construction. Counties in the same areas without shorelines fell far short of this rate of growth.

While the economic gains in these reservoir counties cannot be directly attributed to the presence of new lakes, it cannot be overlooked that the new recreational activities had a pronounced effect. The reservoir counties are better off by nearly all economic yardsticks. However, it should be pointed out, also, that these counties were comparatively depressed prior to the construction of the reservoirs. The impact of the recreation dollar was more dramatic in this situation than it would be in an area of greater economic activity.

Pollution Abatement and Public Health

Clean surface water enhances the well-being of people and influences their choice of place of residence, employment, and recreation. Thus, this is important in sustaining a healthy en-

vironment and in attracting others to the basins.

Clean streams are generally necessary to realize fishing, hunting, and recreational opportunities. Pollution abatement improves land and property values which have a great impact on economic development. Industries are particularly interested in establishing new plants in areas where waste can be handled effectively.

There are varying degrees of pollution in the streams of the Choctawhatchee-Perdido basins and in the coastal areas around Panama City, Pensacola, and Port St. Joe. The pollution is primarily from municipal and industrial wastes and mining operations. To treat these wastes properly, over $78 million in treatment systems and sewerlines will be required by 1975. Construction of these facilities would provide employment in 82 communities in the basins. Other expenditures of over $97 million are expected to be required between 1975 and 2000 to keep abreast of the population growth throughout the basins.

It is difficult to assess the effect of a pollution abatement program. There are intangible economic benefits from improved waters as mentioned above. In these particular basins where recreational and industrial developments are so very important to the future economic development, water quality assumes even greater importance. Pollution abatement now would constitute insurance for future usefulness as well as for immediate purposes.

Public health programs for control of vectors, mainly mosquitoes, are also important, particularly in the Choctawhatchee-Perdido basins where recreation is so important. Tidal marshland, as well as inland swamp areas, offers breeding places for mosquitoes. Much of this can be eliminated by better drainage. Elimination of vectors could help the economy of the area.

Other Economic Impacts

Other noteworthy economic impacts relate to several or all of the functional programs.

Land enhancement impacts—Land and water resources improvements have not been planned specifically for enhancement of land. However, the land enhancement benefits that would result from reservoir construction and certain other projects would be considerable. Waterfront property, particularly that suitable for homesites and recreational and industrial development, is generally marketable at a higher value than nonwaterfront property with other factors being equal. Land that was previously woodland is subdivided into more expensive lots. Other areas become important for industrial property because of stable, ample, and unpolluted water supplies.

There are several factors which influence land enhancement. These factors are:

(1) Proximity to urban population,
(2) shoreline topography,
(3) fluctuation in water level,
(4) water quality,
(5) accessibility and shoreline ownership, and
(6) size of water body.

Land enhancement can be expected of land surrounding reservoirs. In the future, as waterfront property becomes more of a commodity as a result of the increase in population and in leisure time, the enhancement of land will be an even greater secondary effect of water project development.

The taxable lands lost because of a reservoir acquisition or lake development are usually more than offset by the increased valuation of waterfront land improvements. Improvements, however, lead to increased problems and services at the governmental level. Careful planning for waterfront development should precede reservoir construction or recreational area development. Mixed land uses, poor subdivision zoning and design, haphazard road development, and inadequate sanitary facilities can make a reservoir shoreline or recreational area a problem area rather than a community asset. The choice lies between an area with tremendous economic impacts and normal community service requirements or an area with the same economic impacts outweighed by the results of poor planning or no planning for development.

Rapid development of lakeshore property for recreation and commercial use has followed reservoir development throughout the study area. This development with resultant increase in property values has naturally been greater and more rapid in those areas located near major population centers. Reconnaissance studies in the Gainesville, Georgia, area suggest that prop-

erty values in the vicinity of reservoirs extensively used for recreation have increased tenfold during the first 10 to 12 years of development. It can be anticipated that tax revenues from recreational areas will exceed by five times or more the revenues from land used for forestry or general farming.

Impacts from tax revenues—Increased tax revenues usually come as a result of increased economic activity, increased land and resource productivity, more intensive land use, and more real property. Counties that today have a uniform or declining economic activity, low level forest and farm productivity, poor land use, and little new construction are not in a favorable position to realize greater tax revenues. Even tax equalization is difficult under such a situation. Without sufficient tax revenues, government efficiency and extension of community services are almost impossible.

Development of projects and programs envisioned in the comprehensive plan would do much toward alleviating this situation. Increased economic activity would follow as a result of the implementation of the projects and programs. The forestry program would result in increased forest productivity. The soil conservation, reclamation, irrigation, and drainage programs would mean increased farm productivity. Increased economic activity would result in more residential and business construction. All of these effects coupled with judicious tax equalization, mapping and platting, and governmental administration would mean increased tax revenues and more governmental services.

Inundated reservoir lands and lands taken out of production for other projects and purposes may create a loss in taxable property to the county tax rolls. However, these tax revenue losses do not necessarily have to be permanent. In the case of reservoir lands through proper development and management of the shoreline area, the land enhancement and new construction resulting would practically always soon outweigh the losses. In the previously mentioned study of selected counties following reservoir construction in an underdeveloped area in the Arkansas-White-Red River Basins, it was found that taxes levied were up 64 percent at the end of 10 years. Nearby counties without reservoirs increased less than 4 percent in tax revenues. This study also pointed out that the 10-year average annual revenues paid to the counties in lieu of taxes far exceeded the first year tax loss from inundated property. In some cases, this average annual revenue amounted to over 10 times the first year tax loss. On the whole, the average annual revenue was a gain of over 320 percent above the first year tax loss. This revenue is in addition to the 64-percent increase in taxes levied mentioned above.

Impacts from construction activities—The construction of water storage projects and other facilities would provide an economic stimulus during the construction period. This is brought about by the temporary influx of workers for the project who desire housing, food, services, and entertainment. Most of this economic activity, stemming from wages and salaries, is felt locally.

It has been estimated that about 60 percent of the total construction cost is labor cost. Therefore, the economy in the vicinity of the construction project would be affected to a large extent by construction of the project. The investment for materials and equipment would affect a larger area.

Impacts from migration—A high birth rate, a relatively dense population for an agricultural area, and limited employment opportunities have produced in the Southeast River Basins an extremely mobile population. The resulting out-migration and regional urbanization have been good, in many respects, as safety valves which have prevented population pressures from reaching even more undesirable proportions in rural areas. However, migration since the 1930's has also brought about a loss to the area, because these out-migrants represent lost manpower and lost expenditures to the area for the rearing, educating, and training of the migrants.

At the same time, the Southeast River Basins area has evidenced a growing amount of in-migration. Generally, the amount of education, training, and income represented on a per capita basis by this group has been relatively higher than that for the out-migrants. As a result, the economic losses from out-migration have been tempered a little by the economic gains from in-migration.

A migration study was prepared for the Southeast River Basins area as a whole. The results of that study did not provide basins data to show the economic effect of migration on the Choctawhatchee-Perdido basins. However, the trends indicated by the study are assumed to be applicable to the basins.

The study shows that during the period of 1960-75 out-migrants should continue to outnumber in-migrants but not to the extent which was evident from 1930-60. Because the in-migrants are expected to be better educated and skilled than the out-migrants, the area should evidence a modest gain when comparisons are made of the cost of rearing, training, and educating the migrants. During the period of 1975-2000, this economic gain should be even greater because the in-migrants should then begin to outnumber the out-migrants.

Another comparison was made of the personal income of the migrants and anticipated migrants. Under this comparison, the period of 1960-75 should show an economic loss but certainly not nearly as great as that evident during the 1930-60 period. However, during the period of 1975-2000, the area should start to gain economically in this comparison of personal income.

Impacts to redevelopment areas—Of the 26 counties falling wholly or partially in the Choctawhatchee-Perdido basins, 11 have been designated redevelopment areas as of April 20, 1962, under Section 5 (b) of the Area Redevelopment Act of 1961. These have been so designated for varying reasons such as low median family income and persistent and substantial unemployment.

Some of the projects and programs proposed for the basins should help remedy these conditions. For instance, the food and fiber program will improve farm and forest production and income throughout the basins, increasing per capita income, especially for farm families. The commercial fisheries program will increase fish production and assist in increasing employment in the coastal counties. The projects to provide more and better recreational areas will increase per capita income as well as provide additional employment in the vicinity of the individual projects. Many of the projects will create temporary employment during the actual construction phase. In addition, assistance is available to these counties under the provisions of the Area Redevelopment Act. This assistance is in the form of loans for industrial and commercial projects, loans and grants for public facilities, technical assistance, occupational training, and retraining subsistence payments.

Physical

In general, the land and water resources of the basins are adequate both in quantity and quality to meet all demands for use, conservation, and development by the year 2000. Land and water need not be limiting factors in the attainment of high economic levels of development by the residents of the basins.

The planned program is not expected to change the stream regimen appreciably, except for changes downstream from the storage structures. The changes will consist of storage of floods, evening out of the flow, and augmenting low flows. Very little consumptive use of surface water is planned; average flows are expected to be within 1 percent of what they have been.

Effects of drainage, land management, and even urbanization will be evident in some localities but, in the aggregate, will tend to compensate and over most of the basins will have little effect on streamflow. Ground water aquifers extend far beyond the basins boundaries, and the projected withdrawals will be spread over a large area and have negligible effect on ground water availability.

Water quality is expected to remain relatively unchanged, except for improvement in the localities where there is now pollution. Projected ground water withdrawals would be dispersed so that no serious saline intrusion of aquifers along the coast is expected.

Ground water and surface water are closely related in the Choctawhatchee-Perdido basins. Regulation or withdrawal of one will affect the other. However, the total management of water is expected to be so small a fraction of the available natural quantities that the balance between ground water and surface water will not be disturbed.

SECTION IV – PLAN IMPLEMENTATION

Cost Sharing

Resource development costs should be shared so as to serve the public interest best by: (1) Encouraging sound resource development and economic and social stability and growth; (2) promoting maximum efficiency in use of private and public funds; (3) obtaining an equitable relationship between the incidence of costs and benefits; (4) preventing avoidable waste, unwarranted windfall gains, and undesirable competition; (5) encouraging desirable types and sizes of enterprises; (6) securing consistency between the various purposes of resource development; and (7) promoting public understanding and cooperation in resource development.

Two types of costs are shown for cost-sharing analyses: (1) Investment costs, which include all of the costs of project construction including lands and rights-of-way, estimated for the period of development through the year 2000; and (2) operation, maintenance, and replacements costs, shown as an annual cost, and estimated on the basis of development at the year 2000.

Operation, maintenance, and replacements costs for use in cost-sharing determinations are based on full use of the facilities that are specifically proposed. Since the ultimate need during the period studied will not normally develop until the year 2000, the full operation, maintenance, and replacements cost for the facilities included in the plan is shown as "OM&R at year 2000." The comprehensive plan is designed to meet needs to the year 2000, so additional needs, costs, and benefits that may develop after that year have not been evaluated. This does not ignore or preclude the possibility of adding facilities after the year 2000 to the then existing projects and programs to meet additional needs.

Of the total investment costs, it is estimated that about 20 percent would be borne by the Federal Government and about 80 percent by the non-Federal interests. For operation, maintenance, and replacements costs, approximately 5 percent would become the responsibility of the Federal Government and 95 percent would be borne by the non-Federal groups involved in land and water developments.

Pollution abatement costs are the largest item in the Choctawhatchee-Perdido basins 40-year plan, accounting for about 28 percent of the total investment costs. Nearly $176 million in investment costs and an annual operation and maintenance cost of about $2.1 million is expected to be required for full development of the Choctawhatchee-Perdido pollution abatement plan. Under suggested cost-sharing policies, the initial investment costs of the pollution abatement program would be shared about 29 percent by the Federal Government and 71 percent by the non-Federal interests.

The recreation program is the second largest item in the plan, accounting for about 22 percent of the investment costs of the total plan. The Ariton, Crestview, and Deadening Lakes reservoir projects in the plan would have regional benefits and would warrant a larger than average share of Federal participation in the recreation investment costs of the projects.

Programs relating to agriculture are the third largest item of cost in the Choctawhatchee-Perdido basins plan, totaling over $128 million for initial investment costs with annual costs for operation and maintenance of about $3.7 million. The largest of the agricultural programs is that for forest conservation and utilization where the investment costs total about $100 million. The soil conservation and utilization program for the basins is estimated to require an investment cost of $26 million. The cost of the forestry program would be about 35 percent Federal and 65 percent non-Federal for investment cost and 30 percent Federal and 70 percent non-Federal for operation and maintenance. As there is a considerable amount of forest land in Federal ownership in these basins, the Federal share of operation and maintenance cost for forest conservation would be greater than average. The operation and maintenance costs of the soil conservation and utilization program, except on federally owned lands, would be entirely the responsibility of non-Federal interests.

Table 4.12 contains cost-sharing data. Further study may result in different costs and cost-sharing arrangements, particularly for projects.

TABLE 4.12

Cost Sharing—Comprehensive Plan

Purpose or project	Investment costs					Annual operation, maintenance, and replacements costs at year 2000				
	Total ($1,000)	Federal ($1,000)	(pct.)	Non-Federal ($1,000)	(pct.)	Total ($1,000)	Federal ($1,000)	(pct.)	Non-Federal ($1,000)	(pct.)
Purpose[1]										
Flood control	7,026	3,799	54	3,227	46	48	0	0	48	100
Water supplies	118,700	0	0	118,700	100	18,270	0	0	18,270	100
Navigation[2]	16,490	2,600	16	13,890	84	2,520	180	7	2,340	93
Irrigation	1,258	315	25	943	75	215	0	0	215	100
Drainage	1,149	287	25	862	75	30	0	0	30	100
Hydroelectric power	18,080	0	0	18,080	100	131	0	0	131	100
Soil conservation	25,900	7,770	30	18,130	70	1,882	0	0	1,882	100
Forest conservation	100,100	35,040	35	65,060	65	2,007	602	30	1,405	70
Sport fisheries and wildlife[3]	23,180	6,650	29	16,530	71	7,197	44	1	7,153	99
Commercial fisheries	170	100	60	70	40	1,329	797	60	532	40
Recreation[3]	141,850	19,660	14	122,190	86	8,757	560	6	8,197	94
Pollution abatement	175,900	50,700	29	125,200	71	2,140	0	0	2,140	100
Public health	2,300	0	0	2,300	100	3,212	0	0	3,212	100
Project[1]										
Ariton[3]	9,644	4,104	43	5,540	57	123	15	13	108	87
Crestview[3]	39,520	3,220	8	36,300	92	533	60	11	473	89
Deadening Lakes[3]	15,660	9,621	61	6,039	39	793	159	20	634	80
Fishing lakes	759	12	2	747	98	63	0	0	63	100
Water-access areas	12,720	5,088	40	7,632	60	779	117	15	662	85
Upstream watersheds	1,949	783	40	1,166	60	29	0	0	29	100
Brewton levee	684	342	50	342	50	2	0	0	2	100
Flomaton levee	619	310	50	309	50	5	0	0	5	100
Port St. Joe Harbor[2]	6,300	270	4	6,030	96	1,140	20	2	1,120	98
Panama City Harbor[2]	6,030	360	6	5,670	94	1,150	30	3	1,120	97
Pensacola Harbor[2]	2,221	421	19	1,800	81	188	90	48	98	52
Gulf County Canal	539	431	80	108	20	22	21	95	1	5
Perdido Pass	1,400	1,120	80	280	20	20	19	95	1	5

NOTES: [1] Costs for purposes and projects are not additive. Costs of projects are included as a part of the costs by purpose.
[2] Most of the work involved in the three harbor projects is of the nature of terminal facilities which should be paid for by non-Federal interests.
[3] Three multiple-purpose reservoir projects are of regional significance, therefore, increasing the Federal share of recreation and sport fisheries and wildlife costs.

Financing

In 1960, Federal, State, county, local, and private expenditures for resource development in the Choctawhatchee-Perdido basins totaled about $21.3 million. This was equivalent to about 2 percent of the basins total personal income of $1,067 million. An estimated 15 percent of this expenditure was for training, technical aid, and other items not included in the comprehensive plan. Thus, the equivalent of 1.7 percent of the personal income was expended on types of endeavor corresponding to those in the plan.

The projects and programs covered by this Report involve some private expenditures and some items of public expenditures which have been made since January 1, 1960, the starting date used for the evaluation. During the period of analysis, the annual personal income in the basins is expected to be about $1,984 million by the year 1975 and about $6,512 million by the year 2000. If the current proportion of personal income is continued to be invested in resource development to the year 2000, funds would be more than adequate to accomplish the plan.

The annual rate of expenditure needed to accomplish the early action phase developments of the plan, in total and in relation to personal income, is higher than the previous or current rate during the first 10 to 15 years and dimin-

ishes slightly during the last 25 years. This is due to: (1) An immediate demand for facilities not now developed; and (2) the omission of some developments which undoubtedly will be needed in the latter portion of the period 1975-2000, but which were not planned for because the long-range projection of economic conditions used in establishing resources needs was not carried beyond the year 2000.

During the first 10 to 15 years of plan implementation, therefore, there is expected to be need for additional financing at a rate higher than that prevailing in and prior to 1960 in order to provide for an adequate level of improvements consistent with the needs and opportunities within the basins expected to prevail during the next 40 years.

The early action plan to expedite developments now in demand involves capital outlay and operation, maintenance, and replacements costs during the period 1960-75 which would exceed the normal increase of these expenditures at all levels of private and governmental activity. The annual expenditures would be about $10 million above the amounts which would normally be available for work in these basins. The exact amount would depend upon the promptness in implementing the early action phase of the plan.

The Federal expenditure rate in the Choctawhatchee-Perdido basins is expected to be increased, thus providing part of the needed funds. The remaining funds for this acceleration period are expected to come from non-Federal sources such as: State and local governments and private individuals and enterprises. In the case of State and local government, in order to avoid overstressing the current tax base and to enable funds in the hands of private individuals and enterprises to be currently available for the private components of the plan, the additional funds could come from bond issues, development funds, and authority financing.

Responsibility

The basic responsibility for initiating the plan rests with the States and local interests. Even in those fields where a Federal agency is normally the organization which actually performs the detailed planning and construction, the impetus for the planning study must originate with those whom the programs and facilities will benefit.

The comprehensive plan for the Choctawhatchee-Perdido basins is a combination of projects and programs formulated to meet the needs of the people for land and water resource development. In most cases, the Commission studies have not been carried beyond the reconnaissance level and thus additional detailed planning is required prior to implementation of the plan. The authorizing Act specifically provides that the Commission plan shall not include final project designs and estimates.

The proposed assignment of responsibility for initiating the developments is made in the knowledge that timely and active interest on the part of the States and local leadership is required.

The designations included in Table 4.13 are made in accordance with the following criteria:

(1) If an existing project or program is to be expanded by the addition of facilities or acceleration of activity, then the assignment of major responsibility for planning, construction and/or development, and operation is to the agency already having jurisdiction over the existing project or program. For example, if additional facilities are to be provided at a project which is already a Federal project under the administrative supervision of the Corps of Engineers, then this agency would be given major responsibility for planning and construction even though the work actually might be done by other Federal or non-Federal entities.

(2) Where additional facilities are proposed at a project already under non-Federal jurisdiction, then the non-Federal interest is assigned the major responsibility.

(3) Non-Federal programs such as forestry, soil conservation, recreation, fish and wildlife, reclamation, drainage, irrigation, public health, and pollution abatement would continue under non-Federal sponsorship except where such programs apply to national forests, military reservations, and other Federal holdings. Where a clear-cut conclusion is not readily apparent, then selection is to be made on a case-by-case basis, giving due weight to the pertinent circumstances.

TABLE 4.13

Responsibility for Implementing Projects

Major responsibility for implementing designated projects		Project	Early action phase[1]	Purpose[1]	Federal agency with major responsibility for Federal aspects
Non-Federal	--	Crestview	E	P, R, F&W	Federal Power Commission
--	Federal	Ariton	E	FC, R, F&W	Corps of Engineers
Non-Federal	--	Deadening Lakes	E	F&W, R	Bureau of Outdoor Recreation, National Park Service[2]
Non-Federal	--	Fishing lakes	E	F&W, R	Bureau of Sport Fisheries and Wildlife
--	Federal	Brewton levee	--	FC	Corps of Engineers
--	Federal	Flomaton levee	E	FC	Corps of Engineers
--	Federal	Gulf County Canal and Perdido Pass	E	N	Corps of Engineers
--	Federal	Port St. Joe Harbor	E	N	Corps of Engineers
--	Federal	Panama City Harbor	E	N	Corps of Engineers
--	Federal	Pensacola Harbor	E	N	Corps of Engineers

NOTES: [1] E —Early action phase development
P —Hydroelectric power
R —Recreation
F&W—Fish and wildlife
N —Navigation
FC —Flood control
[2] Designated agency depends on the established division of responsibility between the Bureau of Outdoor Recreation and National Park Service.

(4) New projects or programs are assigned to Federal agencies for planning, construction, and operation where there is a substantial involvement of hydroelectric power or navigation since this is the general historical pattern. Exceptions are made in the application of this general rule for certain hydroelectric power facilities where it is found desirable that such facilities be constructed by non-Federal interests either in their entirety or by contractual agreement with Federal interests.

(5) Historical patterns are also observed in the case of flood control. If the project involves the provision of local protection works on the main stream, then the Federal interests would be responsible for construction and non-Federal interests would be responsible for operation and maintenance. In the case of flood plain management to serve flood control purposes, planning, construction, and operation are designated as non-Federal, although local groups may call upon Federal agencies for assistance in planning.

(6) In the application of the criteria, the incidence of benefits is considered in determining appropriate responsibility. Where benefits are of national significance, Federal responsibility is indicated; where they are local, non-Federal responsibility is indicated. Where these benefits are of regional significance, the matter is decided on a case-by-case basis, considering all of the related circumstances.

(7) In the designation of non-Federal and Federal interests for the major responsibility, there is no intention that such selection would ignore the other interests that may be concerned in planning the details of the proposed program or project. This applies also to construction and operation.

The designation of Federal agencies to have major responsibility for projects and programs generally was made on the basis of the agency usually associated with the purpose having the largest portion of the total allocated costs.

Where projects and facilities have been historically constructed by Federal agencies and turned over to local groups for operation and maintenance, it is intended that this practice be continued. An example of this is a local flood protection levee on a principal stream.

The non-Federal or Federal interests with the major responsibility for accomplishment, including coordinating the preauthorization planning, obtaining final approval or authorization of specific works or facilities, budgeting for appropriations or other funding, design of structures, administration of construction or installation,

and other matters pertinent to planning and construction are indicated in Table 4.13. The designation of Federal and non-Federal is not intended to prejudice joint non-Federal and Federal development of power and perhaps other features when and if such a proposal is presented to Congress for final resolution.

Table 4.13 indicates the Federal agency having the major responsibility for the Federal aspects of each project, regardless of the magnitude of these Federal aspects. In the project involving hydroelectric power where the major responsibility is non-Federal, the Federal Power Commission would have the major responsibility. The table is not intended to reflect any lack of interest by other Federal agencies in a project; in fact, most of the Federal land and water agencies have some interest in each of the projects.

In the general programs not included in Table 4.13, the division between non-Federal and Federal principal responsibility is made on the basis of ownership of the land or area involved. For example, wildlife or soil conservation programs on non-Federal lands are the principal responsibility of non-Federal entities; forestry programs on a military reservation or national forest are a principal Federal responsibility; and recreation programs on a Federal multiple-purpose reservoir project, which envisions Federal acquisition of the general reservoir area, are a principal Federal responsibility.

Early Action Phase

Action to achieve the comprehensive plan must be continued for the entire period of analysis. However, in order to meet immediate requirements for developing the basins resources in an orderly manner and to help stimulate growth in the economic structure of the basins, certain projects and programs included in the comprehensive plan should be initiated as quickly as detailed plans can be prepared for them and necessary financing and other arrangements can be made. These more urgent projects and programs have been included in the early action phase of the plan to be accomplished, or in the process of accomplishment, by 1975.

Basinwide programs for conserving, developing, and utilizing land and water resources have been in operation for some time. Their continuation, expansion, and improvement form an important part of the comprehensive plan. Action for implementing these programs would continue for the life of the plan and would generally increase gradually in proportion to population and economic growth. Components of the program on which action should be started early include improvement works having a long time-lag between initial action and full utilization, activities for conserving and protecting resources for future use, and items that require special emphasis or action to bring them in balance with general development.

Work should be undertaken for each of the purposes and projects in the early action phase of the plan as follows:

Early action should be initiated on the Ariton and Crestview projects and the Deadening Lakes development. Following more detailed studies the land area should be acquired, the three dams and reservoirs constructed, and basic facilities for recreation and fishing installed to satisfy existing needs for recreation and fish and wildlife use and to meet expanding needs to 1975.

The Ariton project would reduce flood peaks at Elba and Geneva, Alabama, and Caryville, Florida, and would accommodate 100,000 user-days annualy for recreation, some 36,000 user-days annually for fishing in the reservoir, and 7,000 user-days for fishing downstream of the dam. It is estimated that about 97 percent of the total investment costs for the project would be required in the early action phase.

The Crestview project would result in the addition of 47,000 kilowatts capacity and 53 million kilowatt-hours of hydroelectric power annually and would accommodate 625,000 user-days annually for recreation and some 477,000 user-days annually for reservoir fishing. It is estimated that about 97 percent of the total investment costs for the project would be required in the early action phase.

The Deadening Lakes project includes the Econfina Creek reservoir. The entire development would accommodate 800,000 user-days annually for recreation and some 101,000 user-days of fishing and hunting. About 55 percent of the total investment costs for the project would be required in the early action phase.

The acquistion of land would be required in the improvement and expansion of five existing public fishing lakes and the development of three new lakes. Development of facilities would accommodate about 120,000 user-days annually for recreation and about 34,000 user-days annually for fishing to meet the needs of the population associated with the early action levels of development. It is estimated that about 62 percent of the investment cost for the eight fishing lakes would be required in the early action phase.

Land should be acquired for 37 water-access areas and facilities installed to accommodate about 1,140,000 user-days annually for recreation and about 70,000 user-days annually for freshwater and salt-water fishing to meet the needs of the population associated with the early action levels of development. It is estimated that about 43 percent of the investment cost for the total access-area projects would be required in the early action phase.

The upstream watershed projects should be installed to alleviate existing problems and provide watershed protection, flood prevention, drainage, and water resource development for the improvement of agricultural lands. All installation costs would be incurred in the early action phase.

The Flomaton levee for protection of flooding from Big Escambia Creek should be constructed.

Increments of the water supply program for domestic, municipal, and industrial uses should be installed to keep current with the needs of the population. Unless this is done, undesirable shortages and possible competition between users could occur, and economic growth would be hampered. It is estimated that about 37 percent of the total investment costs for the water supply program would be expended in the early action phase.

The navigation projects should be initiated to provide harbor, channel, and turning basin commerce requirements and expanded terminal facilities at the three deep-water ports; navigable channel dimensions for small craft in Perdido Pass; and enlarged channel dimensions in the Gulf County Canal. It is estimated that about 42 percent of the investment costs for the projects would be required in the early action phase.

The installation of irrigation and drainage programs will depend to a great extent on the desires and needs of individuals and small groups to replace marginal units, improve farm efficiency, and improve land use, as alternatives to other improved management practices. It is estimated that about 48 and 39 percent of the total investment costs, respectively, for the irrigation and drainage programs would be made in the early action phase.

While the utilization of soil resources will be largely controlled by current requirements, reasonable effort should be expended to apply adequate soil conservation practices as quickly as possible on land not now protected. Permanent conservation measures should be installed in the early action phase. It is estimated that about 38 percent of the total investment costs for this program would be required in the early action phase.

To protect and conserve forests for future use, the major parts of tree planting and fire, insect, and disease-control facilities should be installed. To facilitate the present and future operation of the forestry program, forestry education and research should be given early emphasis, and drainage and road facilities should be installed. It is estimated that about 42 percent of the installation costs for the total forest conservation and utilization program would be expended in the early action phase.

The improvement of existing wildlife facilities, extensive development, and supporting programs of additional studies, education, and enforcement activities should be initiated. Likewise for sport fishing, improvement of existing facilities on the rivers and small and large impoundments, new facilities on salt water, and supporting activities should be initiated. It is estimated that about 35 percent of the investment costs of the total single-purpose fish and wildlife program would be expended in the early action phase.

The commercial fisheries programs should be initiated and about one-half of the investment costs expended in the early action phase to restore this basic local industry.

Some features of the recreation program will require action ahead of that required for gradual development to meet current needs. These are

the designation of recreational areas for future use, the acquisition of needed lands, and the installation of basic facilities required for future expansion. It is estimated that about 30 percent of capital improvements would be made during the early action phase of the program for recreation alone.

Immediate action should be taken to initiate the long-range plan for the adequate handling of the liquid wastes. Such wastes must ultimately be discharged into the water courses, and volume will increase in direct proportion to growth and development. Unless long-range pollution abatement plans are accomplished, water resources will be damaged and beneficial uses impaired. It is estimated that about 45 percent of the total investment costs for pollution abatement would be required in the early action phase.

The public health programs of vector control, solid-waste collection and disposal, and air pollution and radiation monitoring should also be initiated to protect and maintain the healthful environment of the basins for the benefits of the residents and attraction for the location of industry, as well as tourists and recreationists. It is expected that these programs, except for incinerator installations, would be initiated and carried out on an annual operations basis. Incinerator investment costs in the early action phase are expected to be 17 percent of the costs in the long-range plan.

TABLE 4.14

Summary of Early Action Investment Costs
(thousands of dollars)

Project or program	Investment to 1975
Ariton	9,396
Crestview	38,190
Deadening Lakes	8,550
Fishing lakes	474
Water-access areas	5,432
Upstream watersheds	1,949
Flomaton levee	619
Water supplies	43,620
Port St. Joe Harbor	2,338
Panama City Harbor	2,214
Pensacola Harbor	424
Gulf County Canal	539
Perdido Pass	1,400
Irrigation	603
Drainage*	73
Soil conservation	9,800
Forest conservation	42,330
Fish and wildlife*	2,500
Recreation*	30,310
Pollution abatement	78,390
Public health	400

* Data presented are exclusive of investments associated with multiple-purpose projects.

SECTION V – PROJECTS AND PROGRAMS

The comprehensive and coordinated plan for the Choctawhatchee-Perdido basins includes land and water resource developments that contribute to meeting the needs projected to the year 2000. Resource developments existing and under construction as of 1960 are a necessary part of the plan to meet the needs. However, only proposals for new developments and for expansion of existing developments to be made during the period 1960-2000 are presented and their costs and benefits evaluated.

Projects and programs are summarized under Plan by Purpose in Section II of this Part. Only the pertinent parts of multiple-purpose developments are covered by the Plan-by-Purpose summaries. In order to bring all of the data for multiple-purpose developments together, each project or program involving joint uses of facilities is described in the pages that follow, and summaries for the entire project are provided.

A detailed summary of some existing and proposed single-purpose facilities are also included to provide additional background for the comprehensive plan. An analysis of functions by States and the early action phase of development are shown.

The details of the projects and programs are summarized in the same order as they appear in the Comprehensive Plan for Development, Table 4.1.

All elevations shown are related to mean sea level. Spillway discharges shown were estimated for a reservoir water surface at maximum pool elevation.

ARITON PROJECT

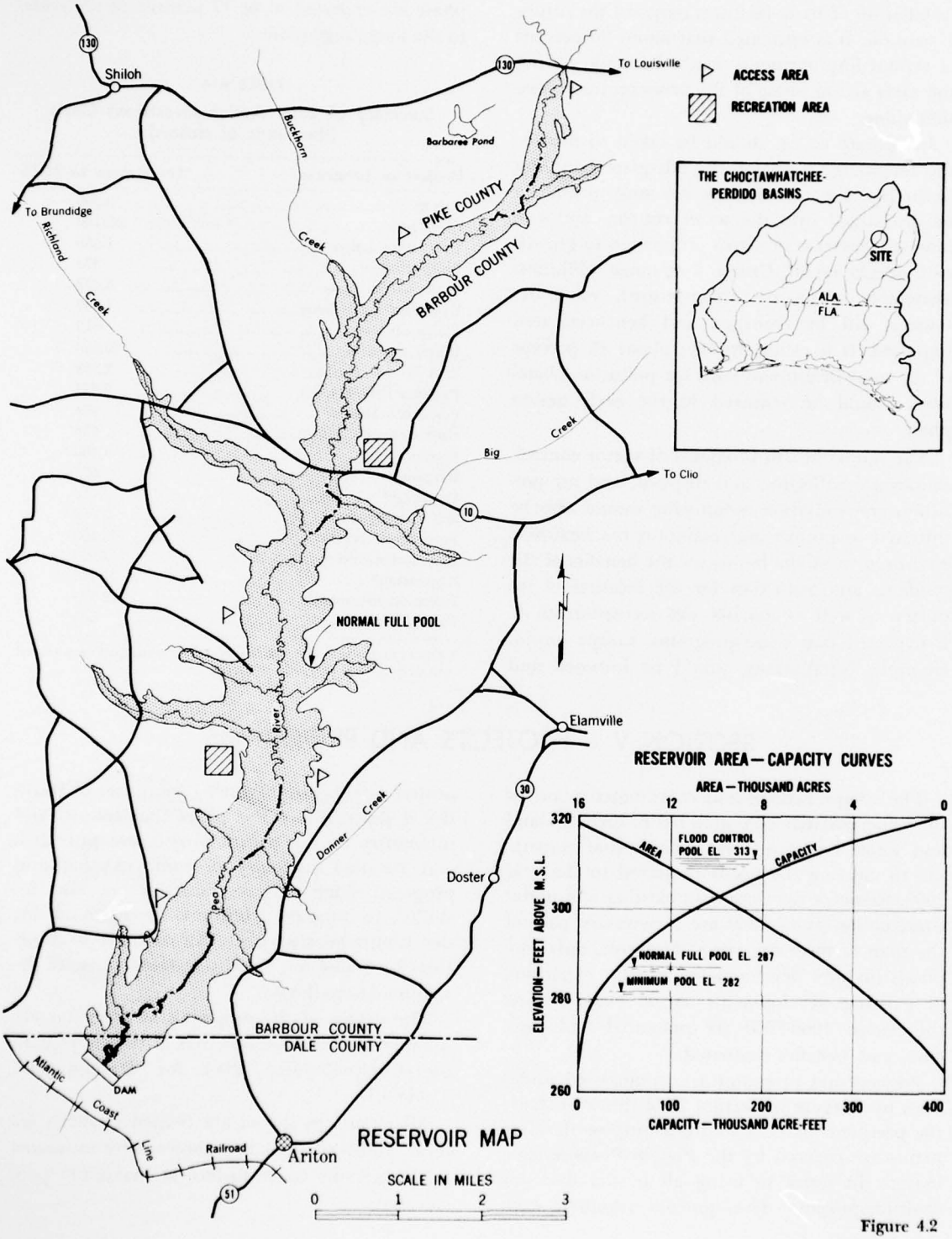


Figure 4.2

ARITON PROJECT

Location

The Ariton damsite is 3 miles northwest of Ariton, Dale County, Alabama, on the Pea River at mile 93. The eastern portion of the reservoir would be in Dale and Barbour Counties and the western portion would be in Dale and Pike Counties and would extend upstream about 13 miles.

Plan

The proposed project consists of a dam and reservoir, access roads, and recreation areas. It would provide benefits for recreation, fish and wildlife, and flood control.

The dam would be an earthfill structure with a side channel spillway. At normal full pool the reservoir would have an area of 5,000 acres. Flood control storage between normal pool and spillway crest would reduce flooding at Elba and Geneva, Alabama, and Caryville, Florida. This storage would be equivalent to 7.9 inches of runoff from the drainage area of 592 square miles. A gated outlet would be incorporated in the structure for release of a minimum flow of 160 cubic feet per second.

The area which would be inundated by the reservoir is mostly wooded and relocations would be minor. The facilities, in addition to flood control, would be for fishing, picnicking, swimming, boating, camping, and sightseeing and would satisfy requirements for about 43,600 user-days of fishing and 350,000 user-days of recreation. About 1,400 user-days of hunting would be lost.

Data

	Unit	Amount
Dam and reservoir		
Drainage area	sq. mile	592
Dam		
Maximum height	ft.	50
Length	ft.	4,600
Top elevation	ft.	327
Spillway		
Length	ft.	1,500
Crest elevation	ft.	313
Design discharge	c.f.s.	148,000
Reservoir		
Normal full pool elevation	ft.	287
Normal full pool area	acre	5,000
Normal full pool capacity	acre-ft.	40,000
Runoff depth, normal full pool	inch	1.3
Maximum design pool elevation	ft.	323
Minimum pool elevation	ft.	282
Minimum pool area	acre	3,500
Minimum pool capacity	acre-ft.	20,000

Benefits

Annual Equivalent Primary Tangible ($1,000)

Recreation	398
Fish and wildlife	80
Flood control	390
Total	868

Impacts

The creation of a large fresh-water lake in this area, where none now exists, would result in considerable homesite development areas around the lakeshore. However, no additional land has been included in the project for the purpose of project analysis, although it is expected that the project sponsors would take appropriate steps to channel part of the benefits to the periphery lands into project repayment. Neither have enhancement-type benefits been included for the project. Land values would increase following completion of the project. Tax revenues to the local governments would also increase.

Barbour County has been declared a distressed area by reason of low farm income in the county. The construction of the dam and reservoir would provide employment, sales of materials and equipment, increased housing and food service opportunities, and many other associated benefits during the installation period to Barbour, Pike, and the surrounding counties. If 60 percent of the construction costs would be spent locally for wages, some $5.8 million would be spent in the local area.

After construction of the dam and filling of the reservoir, many new opportunities for employment would occur in trades and services, such as boat building, rental, and repair; swimming and water skiing equipment and supplies; food services; and automobile services. Increased wages and new business would have a tremendous effect on the two counties involved. The location, near U. S. Highway No. 231 to Panama City, Florida, has many unevaluated benefits. These would include increased employment op-

portunities in motels, restaurants, auto and boat sales and services, and souvenir manufacture and sales. The reservoir would serve as a recreational area for Armed Forces personnel at Fort Rucker and other military posts in the general area. Recreationists from a wide area would be attracted to use the 13-mile long reservoir for sailboating, speedboating, and water skiing.

Costs ($1,000)

Investment	Early action	Total
Dam and reservoir	8,371	8,371
Recreation facilities	995	1,243
Fish and wildlife facilities	30	30
Total	9,396	9,644

Annual Equivalent

	Total
Investment	344
Operation, maintenance, and replacements	107
Total	451

Allocation of Costs ($1,000)

	Investment	Annual equivalent		OM&R at year 2000
		Total	OM&R	
Recreation	3,820	211	76	92
Fish and wildlife	1,089	44	5	5
Flood control	4,735	196	26	26
Total	9,644	451	107	123

CRESTVIEW PROJECT

Location

The Crestview damsite is located on the Yellow River about 4 miles west of Crestview in Okaloosa County, Florida, and about 2 miles upstream from the bridge crossing the river on U. S. Highway No. 90. The reservoir would extend upstream from the dam about 38 miles, 18 of which would be in Alabama.

Plan

The proposed project consists of a dam and reservoir, access roads, recreation areas, and a hydroelectric powerplant.

The dam with top elevation of 160 feet would be an earth dam with a concrete spillway section near the center of the dam. Normal full pool would create a reservoir area of 49,500 acres. A powerplant would be constructed on the east side of the river with an installed capacity of 47,000 kilowatts capable of generating energy of 53 million kilowatt-hours on the average annually. The normal operating head on the powerplant at maximum power pool elevation 150 feet would be 90 feet.

The maximum drawdown of the reservoir would not exceed 10 feet. Under normal flows of the Yellow River, drawdown for power is not expected to exceed 3 or 4 feet at any season of the year.

Twenty-five hundred acres adjacent to the reservoir would be needed for recreation and fish and wildlife facilities. The facilities would provide for boating, fishing, camping, hiking, swimming, picnicking, and sightseeing and would satisfy the requirements for 62,000 user-days of recreation annually by 1975 and an additional 625,000 user-days by 2000. Access points to the reservoir would provide facilities for fishermen and accommodate 489,000 user-days of reservoir fishing annually. The reservoir would result in a loss of 14,000 user-days of hunting. No allocation of storage for water supply has been made since projected demands are less than the minimum downstream releases from the reservoir. However, provision could be made for the necessary access to the reservoir and for water supply facilities should the local people desire to obtain water from the reservoir rather than below the dam.

Data

Dam and reservoir	Unit	Amount
Drainage area	sq. mile	616
Dam		
Maximum height	ft.	100
Length	ft.	7,200
Top elevation	ft.	160
Spillway		
Length	ft.	200
Crest elevation	ft.	120
Gates, 50 ft. x 35 ft.		4
Design discharge	c.f.s.	150,000
Reservoir		
Normal full pool elevation	ft.	150
Normal full pool area	acre	49,500
Normal full pool capacity	acre-ft.	1,580,000

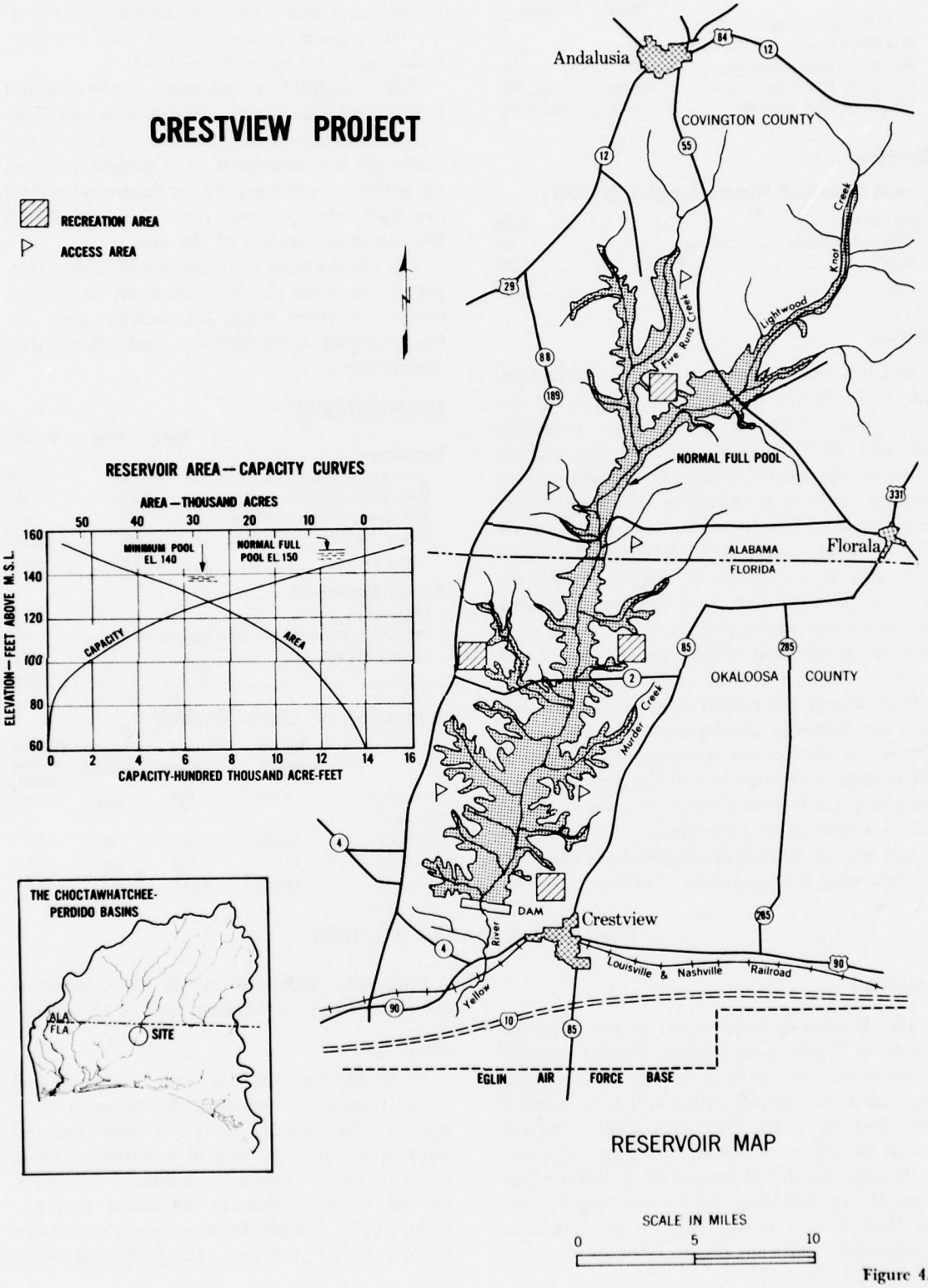

CRESTVIEW PROJECT
RECREATION AREA
ACCESS AREA
RESERVOIR AREA — CAPACITY CURVES
AREA — THOUSAND ACRES
50 40 30 20 10 0
MINIMUM POOL EL. 140
NORMAL FULL POOL EL. 150
CAPACITY
AREA
ELEVATION — FEET ABOVE M.S.L.
160 140 120 100 80 60
0 2 4 6 8 10 12 14 16
CAPACITY-HUNDRED THOUSAND ACRE-FEET
THE CHOCTAWHATCHEE-PERDIDO BASINS
ALA
FLA
SITE
Andalusia
COVINGTON COUNTY
Five Runs Creek
Lightwood Knot Creek
NORMAL FULL POOL
ALABAMA
FLORIDA
Florala
OKALOOSA COUNTY
Murder Creek
DAM
Crestview
Yellow River
Louisville & Nashville Railroad
EGLIN AIR FORCE BASE
RESERVOIR MAP
SCALE IN MILES
0 5 10

Figure 4.3

	Unit	Amount
Runoff depth, normal full pool	inch	4.8
Maximum design pool elevation	ft.	155
Minimum pool elevation	ft.	140
Minimum pool area	acre	39,000
Minimum pool capacity	acre-ft.	1,160,000

Benefits

Annual Equivalent Primary Tangible ($1,000)

Recreation	2,094
Fish and wildlife	691
Power	1,154
Total	3,939

Impacts

Impacts would stem largely from recreation, fish and wildlife, and hydroelectric power developments. Recreational activities, including fish and wildlife, would provide the greatest effect on the local economy. Speedboating, sailboating, and water skiing in the 38-mile long reservoir would create wide interest and attract visitors from a large area. Activities associated with this multiple-purpose project would increase sales of gasoline, food, lodging, beverages, and recreation and fishing equipment and thus improve ability and willingness of non-Federal interests to pay the local share of project costs.

Even though the project does not include land area for homesite development, it may be desirable for the project sponsors to take appropriate steps to channel part of the benefits to the periphery lands into project repayment. Land values immediately surrounding the reservoir would increase following completion of the project enlarging the tax revenues to the local governments. There would be increased revenues to county governments over the very low taxes from forest and agricultural lands.

The availability of hydroelectric power would help meet future power demands and contribute to the continued growth of the Crestview area. Although not calculated as a project purpose, an adequate water supply for future municipal and industrial purposes may likewise enhance the continued growth of the area.

The construction activities would have a temporary effect on the local economy as a good portion of these wages are usually spent for food, lodging, entertainment, and other living expenditures.

Costs ($1,000)

	Early action	Total
Investment		
Dam and reservoir	22,790	22,790
Recreation facilities	3,100	4,430
Fish and wildlife facilities	370	370
Power facilities	11,930	11,930
Total	38,190	39,520
Annual Equivalent		
Investment		1,410
Operation, maintenance, and replacements		480
Taxes foregone		339
Total		2,229

Allocation of Costs ($1,000)

	Investment	Annual equivalent		OM&R at year 2000
		Total	OM&R	
Recreation	8,420	552	265	318
Fish and wildlife	13,020	554	84	84
Power	18,080	1,123	131	131
Total	39,520	2,229	480	533

DEADENING LAKES PROJECT

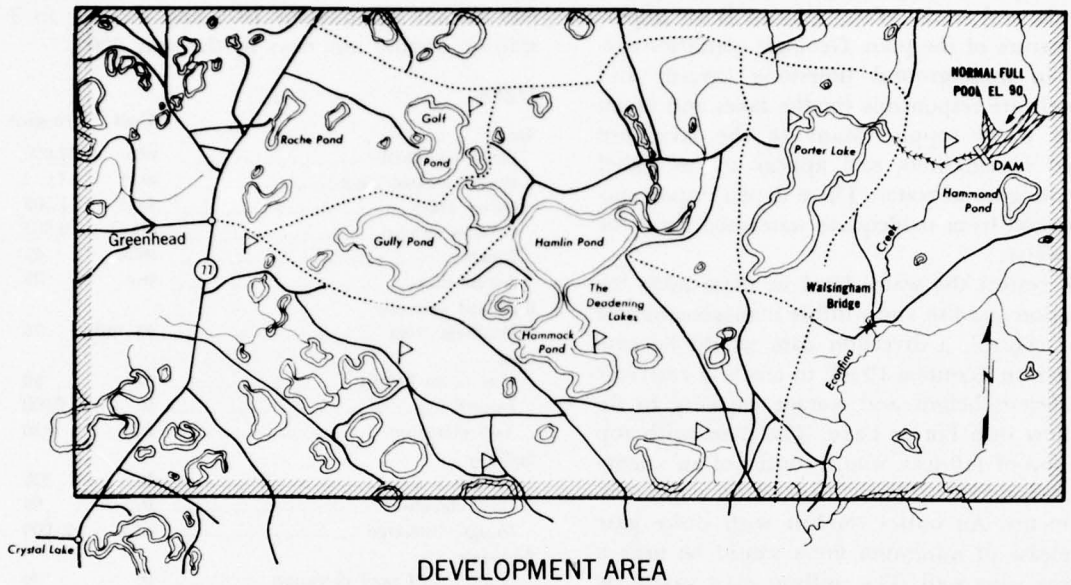
Location

The Deadening Lakes area, in the southeast corner of Washington County, Florida, consists of numerous clear lakes of varying sizes and rolling sand hills covered with scrub oak, longleaf pine, and wire grass. The area contains approximately 50 lakes with a total surface area of about 5,500 acres. Surface elevations of the lakes range from 41 feet for those in the south to 75 feet for those in the north. Water levels fluctuate considerably and some of the lakes are dry during drought periods. Econfina Creek traverses the eastern and southeastern part of the area.

Plan

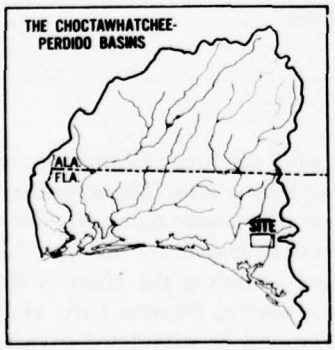
With development, the area has land and water resources capable of becoming a playground which would satisfy the recreation and hunting and fishing needs of hundreds of thousands of persons annually, including swimmers, boaters, campers, hunters, fishermen, and picnickers. The Florida Development Commission made a study of this area. The published results

DEADENING LAKES PROJECT



SCALE IN MILES
0 1 2 3

- ACCESS AREA
- PROPOSED ROADS
- PROPOSED DIVERSION
- PROPOSED RESERVOIR
- AREA BOUNDARY



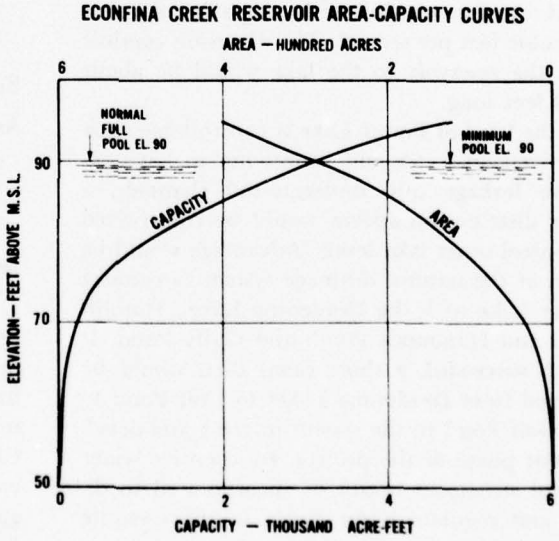


Figure 4.4

of their investigation were considered in formulating this plan.

Essential to the development of the area would be the building of access roads, camp grounds, boat ramps, bathing areas, bathhouses, picnic grounds, and trails. Water control is an important feature of the plan. Geologic conditions related to underground limestone caverns and channels are responsible for the lakes and much of the water supply. Many of the lakes are formed in sinkholes and appear to be sealed from the ground water. These depend upon surface runoff from inadequate watershed areas for their water.

To control the water level in these lakes for recreation and fish and wildlife management and vector control, a diversion dam would be constructed on Econfina Creek to create a reservoir of sufficient height and storage capacity to divert flow into Porter Lake. The dam, with top elevation of 110 feet, would consist of an uncontrolled concrete spillway flanked by earth embankments. An outlet conduit with sluice gate for release of minimum flows would be near a spillway wing wall. The spillway crest would be at elevation 95 feet with a reservoir area of about 400 acres and a total volume of about 5,000 acre-feet. Normal pool would be at elevation 90. Diversion to Porter Lake would be through a 5-foot diameter conduit with a capacity of about 100 cubic feet per second. The diversion conduit from the reservoir to the lake would be about 8,000 feet long.

If the level of Porter Lake is controllable with the diversion water and proves not to have excessive leakage into underground channels, a water distribution system would be constructed to control other lake levels. Advantage would be taken of the natural drainage system to connect Porter Lake with the Deadening Lakes, Hamlin Pond and Hammock Pond, and Gully Pond. If this is successful, a short canal then would be dredged from Deadening Lakes to Golf Pond to add Golf Pond to the system in the water-development phase of the project. Inexpensive water control structures would be incorporated to divert and regulate water levels in the separate lake units for management purposes.

It is expected that, with water-level control, the 4,000 acres of lake area proposed for development would sustain about 95,000 user-days of sport fishing annually by 2000. Hunting opportunities on the project area are expected to provide for 6,000 user-days annually by 2000.

With the varied recreational activities proposed, the area is expected to accommodate 800,000 annual user-days by 1975 and increase to 2 million annual user-days by the year 2000.

Data

	Unit	Amount
Area		
Land (sandhills)	acre	37,000
Water control lakes	acre	4,000
Other lakes	acre	1,500
Cypress swamp	acre	2,500
Roads	mile	45
Access sites	site	25
Dam and reservoir		
Drainage area	sq. mile	70
Dam		
Maximum height	ft.	50
Length	ft.	2,000
Top elevation	ft.	110
Spillway		
Length	ft.	320
Crest elevation	ft.	95
Design discharge	c.f.s.	40,000
Reservoir		
Normal full pool elevation	ft.	90
Normal full pool area	acre	300
Normal full pool capacity	acre-ft.	3,000
Runoff depth, normal full pool	inch	0.8
Maximum design pool elevation	ft.	105
Minimum pool elevation	ft.	90
Minimum pool area	acre	300
Minimum pool capacity	acre-ft.	3,000

Benefits

Annual Equivalent Primary Tangible ($1,000)

Fish and wildlife	164
Recreation	2,860
Total	3,024

Impacts

Development of this area will provide a unique recreation and fishing area. The secondary benefits from these two leisure-time activities would have a tremendous impact on the area. Business in the vicinity, including the cities of Bonifay, Chipley, Lynn Haven, Panama City, and other communities, would be stimulated from sales of gasoline, food, lodging, and recreation and fishing equipment, and thus improve the ability and the willingness of non-Federal interests to pay the local share of the project costs.

The increase in land values as a result of the

project would also be of great benefit to the county. Washington County, being an area of unemployment and underemployment, would profit in increased tax revenues from higher valued land and home construction. The resultant construction of vacation homes around the various lakes would be an impetus to the local economy too. There would also be effects from construction of the various public facilities.

Because this project is located in an economically distressed area, it should be considered a demonstration project with regional significance. Not only would the project demonstrate the effects of a water recreation development project on the economy of a distressed area but it also would lend itself to a demonstration of combined recreation and fish and waterfowl management procedures. Alternate raising and lowering of water levels for these purposes would be compatible under this project.

Costs ($1,000)

	Early action	Total
Investment		
Water control structures	2,730	2,730
Recreation facilities	4,580	11,690
Fish and wildlife facilities	1,240	1,240
Total	8,550	15,660
Annual Equivalent		
Investment		564
Operation, maintenance, and replacements		620
Total		1,184

Allocation of Costs ($1,000)

	Investment	Annual equivalent		OM&R at year 2000
		Total	OM&R	
Recreation	14,160	1,021	511	673
Fish and wildlife	1,500	163	109	120
Total	15,660	1,184	620	793

FISHING LAKES

Location

Five existing fishing lakes are located in Alabama in the counties of Coffee, Crenshaw, Pike, Geneva, and Dale; and two are located in Florida, Bear Lake in Santa Rosa County and Silver Lake in Okaloosa County. Three new fishing lakes in Alabama would be located in Conecuh, Pike, and Geneva Counties.

Plan

In Alabama the program would provide for the improvement and expansion of the five existing lakes and the development of the three new lakes for recreational and fish and wildlife purposes. Improvement and expansion of the existing lakes in Alabama would be directed toward the acquisition of additional lands and development of facilities for recreational activities, other than hunting and fishing. Although originally constructed for single-purpose fishing by the Alabama Department of Conservation in cooperation with local interests, the project areas have been utilized for picnicking, hiking, and other related activities. The full potentials of the existing lakes have not been fully utilized, however, due to the lack of adequate facilities. Plans for development of the existing and the new lakes, therefore, would provide for the development of nature trails, camp grounds, picnic areas, bridle paths, and related features. The development and expansion of the fishing lakes would be with a view to diversifying and enhancing recreational opportunities to complement but not interfere with sport fishing.

Expected additional use in the Alabama lakes would be as follows:

Data

	Acres	User-days*	
		1975	2000
Existing lakes			
Coffee County			
Public Lake	80	15,000	30,000
Crenshaw County			
Public Lake	53	15,000	30,000
Pike County			
Public Lake	45	15,000	30,000
Geneva County			
Public Lake	65	15,000	30,000
Dale County			
Public Lake	92	15,000	30,000
Subtotal	335	75,000	150,000
New lakes			
Conecuh County			
Public Lake	150	27,000	42,000

	Acres	User Days*	
		1975	2000
Pike County			
Public Lake	150	26,000	41,000
Geneva County			
Public Lake	150	26,000	41,000
Subtotal	450	79,000	124,000
Total	785	154,000	274,000

* User-days shown for five existing lakes are for recreation and do not include fish and wildlife use above the level of 1960. User-days shown for three new lakes include, for recreation, 45,000 in 1975 and 90,000 in 2000, the remainder being fish and wildlife use.

Benefits

Annual Equivalent Primary Tangible ($1,000)

Recreation	171
Fish and wildlife	61
Total	232

Impacts

The fishing lakes in Alabama would provide a wide distribution of low-cost facilities to make fishing, hunting, and other recreational opportunities available in inland areas of the basins. A main objective of the county public lakes would be to keep fishing and other water-based activity available to the public and, at the same time, protect the rights of private property holders who wish to restrict use of their privately owned lands.

Local benefits would result from sales and services of equipment and supplies to the users.

Costs ($1,000)

	Early action	Total
Investment		
Recreation facilities	445	730
Fish and wildlife facilities	29	29
Total	474	759
Annual Equivalent		
Investment		24
Operation, maintenance, and replacements		56
Total		80

Allocation of Costs ($1,000)

	Investment	Annual equivalent		OM&R at year 2000
		Total	OM&R	
Recreation	730	62	39	46
Fish and wildlife	29	18	17	17
Total	759	80	56	63

Special Considerations

No attempt has been made to locate precisely the three proposed fishing lakes. Each would be located where the topography and drainage area would be satisfactory for a lake area of about 150 acres. They would be as widely distributed as possible to avoid any overlapping of public service.

Facilities similar to those for the fishing lakes in Alabama would be available in the Florida portion of the basins in the proposed Deadening Lakes development in southeast Washington County and in the North Bay embayment above Panama City completed in 1962 to supplement the fishing provided at Bear and Silver Lakes.

WATER ACCESS AREAS

Location

The water-access areas would be located along the rivers of the Choctawhatchee-Perdido basins, along the coastal waters, and at lakes and small reservoirs in the interior of the basins. Not included in this classification are the access areas adjacent to the proposed large dams and reservoirs, and the public fishing lakes, the access points in connection with the Deadening Lakes area, and the high density and general recreation areas.

Plan

A total of 72 access areas would be acquired and developed in the basins and would be spaced about 5 to 10 miles apart at readily available locations. Twenty-two of these would be along the coast and 50 on streams. Two of the coastal access areas would be for recreation; and 20 of the coastal access areas and 20 of the stream access areas would be used jointly for recreation and fish and wildlife. The remaining 30 stream areas would be for fish and wildlife. Four different size areas would be developed: Type A would average about 75 acres; Type B, about 40 acres; Type C, about 10 acres; and Type D, about 2 acres. The development of Types A, B, and C areas would include roads; water supply and sanitary facilities; and sightseeing, picnicking, swimming, camping, and boating facilities. Type D access areas would have more limited facilities mainly for parking and access to the water for fishing and hunting.

The 22 sites on the coast would consist of 7 Type A, 5 Type B, and 10 Type C. The 50 sites on the streams would consist of 5 Type A, 10 Type B, 5 Type C, and 30 Type D.

Thirty-seven areas would be developed by 1975, including 2 for recreation and 10 joint-use sites on the coast, 5 joint-use sites on streams, and 20 sites on streams for fish and wildlife.

The developments by 1975 would include 5 Type A, 4 Type B, and 3 Type C on the coast; and 1 Type C, 4 Type B, and 20 Type D on the streams.

Data

Type and use of access areas

State	Type	Number	User-days (1,000)	
			Recreation	Fish and wildlife
Alabama	A	0	0	0
	B	7	420	14
	C	4	160	8
	D	3	0	6
Subtotal		14	580	28
Florida	A	12	1,200	20
	B	8	480	16
	C	11	440	22
	D	27	0	54
Subtotal		58	2,120	112
Total		72	2,700	140

Benefits

Annual Equivalent Primary Tangible ($1,000)

	Alabama	Florida	Total
Recreation	1,020	3,683	4,703
Fish and wildlife	14	56	70
Total	1,034	3,739	4,773

Impacts

The access areas would provide a wide distribution of low-cost facilities to make the streams, lakes, and coastal areas available to people all over the basins. Use of private land along water bodies is becoming more and more restricted. This restriction limits the use of the basins water bodies and makes fishing and other water-based activities more and more difficult for the public. The objective of the access areas is to keep the fishing areas available to the public and, at the same time, protect the rights of private property holders.

The access sites will provide convenient points to reach the streams, lakes, and Gulf coast for fishing, flood forecasting, water sampling, and other purposes outside the recreational fields.

In addition to the tangible benefits evaluated, local benefits would result from sales and services of equipment and supplies to the users.

Costs ($1,000)

	Alabama	Florida	Total
Investment			
Early action			
Recreation facilities	488	4,594	5,082
Fish and wildlife facilities	50	300	350
Total	538	4,894	5,432
Total			
Recreation facilities	2,820	9,200	12,020
Fish and wildlife faciiities	142	558	700
Total	2,962	9,758	12,720
Annual Equivalent			
Investment	106	354	460
Operation, maintenance, and replacements	176	603	779
Total	282	957	1,239

Allocation of Costs ($1,000)

	Investment	Annual equivalent	
		Total	OM&R*
Alabama			
Recreation	2,820	269	167
Fish and wildlife	142	13	9
Subtotal	2,962	282	176
Florida			
Recreation	9,200	902	568
Fish and wildlife	558	55	35
Subtotal	9,758	957	603
Total			
Recreation	12,020	1,171	735
Fish and wildlife	700	68	44
Total	12,720	1,239	779

* Annual equivalent operation, maintenance, and replacements costs are the same as the operation, maintenance, and replacements costs at year 2000.

Special Considerations

No attempt has been made to locate precisely the proposed access areas. They could be located at or near highway crossings, in upstream watershed projects, or other suitable sites readily available.

The access sites would utilize the existing natural, scenic, and wildlife habitat conditions by making them available to the public and adding facilities for the fisherman and recreationist.

UPSTREAM WATERSHED PROJECTS

Location

Watershed areas in the basins were analyzed as typical projects. No specific locations are selected for final development.

Plan

Multiple-purpose flood prevention and drainage projects are proposed for development between 1960 and 2000 on tributary streams draining some 900,000 acres. The structural works of improvement would protect and provide for the improvement of agricultural lands and other areas. In addition, many of the desired land-use changes would be made possible by more effectively utilizing, protecting, and developing the land and water resources of the basins.

Changes in the criteria for project selection, evaluation, installation, and cost sharing due to legislative changes which cannot be predicted, or increased local interest, or other factors such as changes in the amount of watershed technical assistance, would substantially change the estimate and result in a different rate of watershed project installations. The possibility of changes in the watershed program is recognized. Appropriate recognition of actual developments and resulting modifications can be accomplished as a part of keeping the plan up to date.

Upstream watershed projects would provide watershed protection, flood prevention, and water resources development for other purposes in the upstream areas. The structural works of improvement included would result in reducing the average annual floodwater and sediment damages occurring under existing conditions on a substantial area of flood plains in the small-stream watersheds. Flood protection in these areas would enable landowners to convert some low value production and use areas to highly productive areas by eliminating the existing flood hazards.

Benefits

Annual Equivalent Primary Tangible ($1,000)

Flood prevention	64
Drainage	63
Total	127

Impacts

Corrective measures to prevent soil erosion together with utilization of sediment storage capacities provided in upstream structures will reduce sediment storage requirements in downstream reservoirs.

Costs ($1,000)

	Early action	Total
Investment		
Flood prevention	988	988
Drainage	961	961
Total	1,949	1,949
Annual Equivalent		
Investment		70
Operation, maintenance, and replacements		29
Total		99

Allocation of Costs ($1,000)

	Investment	Annual equivalent	
		Total	OM&R*
Flood prevention	988	51	15
Drainage	961	48	14
Total	1,949	99	29

* Annual equivalent operation, maintenance, and replacements costs are the same as the operation, maintenance, and replacements costs at year 2000.

Special Considerations

Fishing lakes have been included in the plan in the Alabama portion of the basins. These lakes will provide some of the advantages and benefits of small impoundments in upstream areas. Increased local interest and need for resource development in upstream areas can be considered in keeping the plan current.

BREWTON LEVEE

Location

Brewton is located in southwest Alabama in the south-central part of Escambia County about 7 miles above the Florida State line. Burnt Corn and Murder Creeks join in the southern part of Brewton about 2 miles above the confluence of Murder Creek with the Conecuh River.

Plan

A levee system is proposed for protection of low-lying areas of the city from flooding on

BREWTON PROJECT

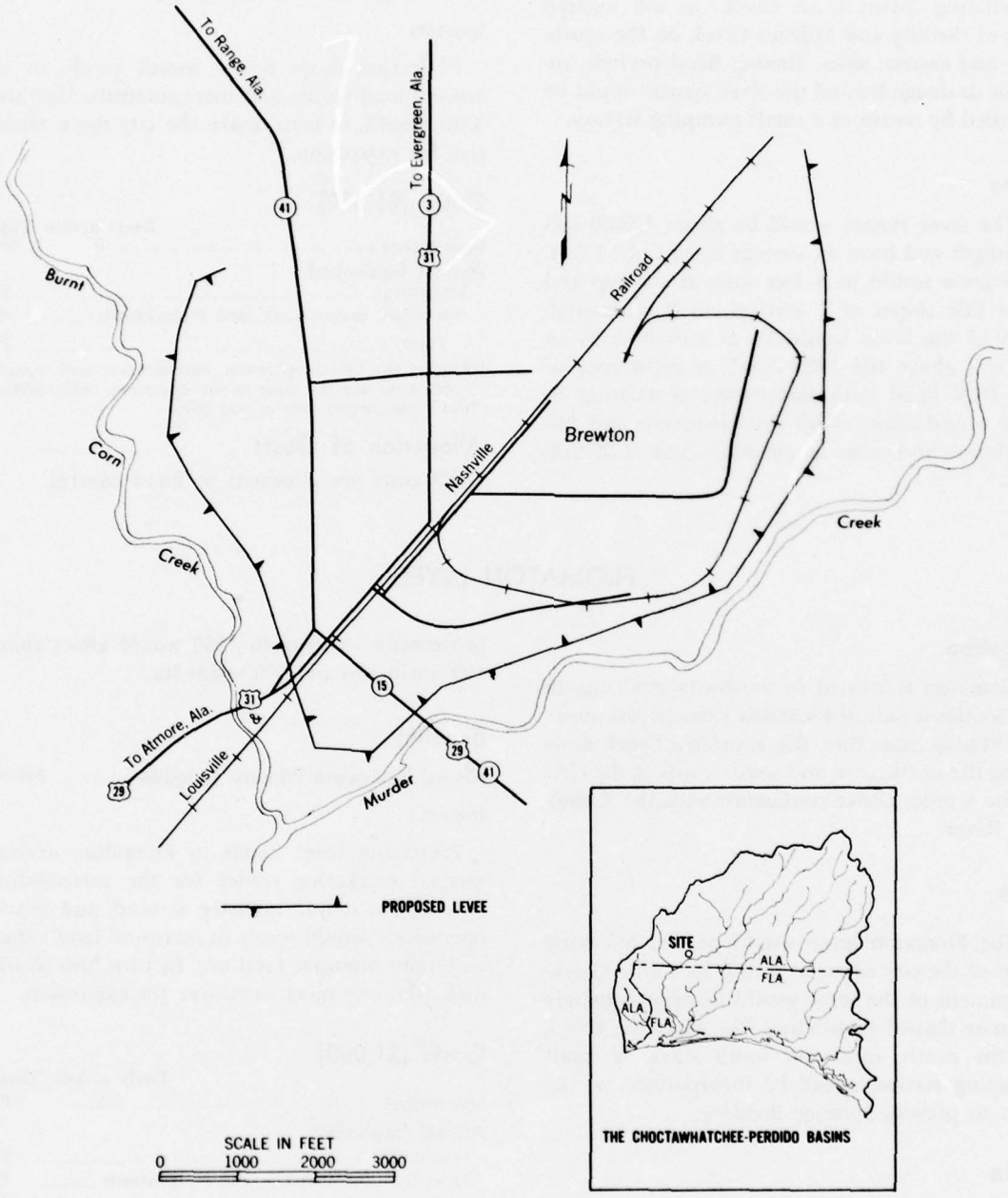


Figure 4.5

Burnt Corn and Murder Creeks. The levee alignment would be approximately crescent shaped, paralleling Burnt Corn Creek on the western side of the city and Murder Creek on the southerly and eastern sides. During flood periods, interior drainage behind the levee system would be handled by means of a small pumping station.

Data

The levee system would be about 19,000 feet in length and have an average height of 14 feet. The levee would be 8 feet wide at the top and have side slopes of 1 vertical on 2 horizontal. Top of the levee would be at elevation 94 or 3.3 feet above the 1929 flood. A recurrence of the 1929 flood with improvements existing in 1960 would affect about 140 businesses and 215 residences and cause an estimated loss of $2 million.

Benefits

Annual Equivalent Primary Tangible $29,000

Impacts

Protection from floods would result in increased land values and more intensive land use. This would, in turn, make the city more attractive for expansion.

Costs ($1,000)

	Early action	Total
Investment	0	684
Annual Equivalent		
Investment		25
Operation, maintenance, and replacements		•2
Total		27

• Annual equivalent operation, maintenance, and replacements costs are the same as the operation, maintenance, and replacements costs at year 2000.

Allocation of Costs

All costs are allocated to flood control.

FLOMATON LEVEE

Location

Flomaton is located in southwest Alabama in the southern part of Escambia County just above the Florida State line. Big Escambia Creek flows along the north, east, and south limits of the city, about 4 miles above confluence with the Escambia River.

Plan

The Flomaton levee would protect low-lying areas of the city adjacent to Big Escambia Creek. Alignment of the levee would be approximately crescent shaped paralleling Big Escambia Creek on the north, east, and south sides. A small pumping station would be incorporated in the plan to prevent interior flooding.

Data

The levee system would be about 18,000 feet long, have an average height of 16 feet, an 8-foot width at the top, and have side slopes of 1 vertical on 2 horizontal. The top of the levee at elevation 81.3 would be 3 feet above the 1929 flood stage. A recurrence of the 1929 flood with improvements existing in 1960 would affect about 100 businesses and 390 residents.

Benefits

Annual Equivalent Primary Tangible $45,000

Impacts

Protection from floods to Flomaton, a commercial marketing center for the surrounding area whose major industry is sand and gravel operations, would result in increased land values and more intensive land use. In turn, this would make the city more attractive for expansion.

Costs ($1,000)

	Early action	Total
Investment	619	619
Annual Equivalent		
Investment		22
Operation, maintenance, and replacements		•5
Total		27

• Annual equivalent operation, maintenance, and replacements costs are the same as the operation, maintenance, and replacements costs at year 2000.

Allocation of Costs

All costs are allocated to flood control.

FLOMATON PROJECT

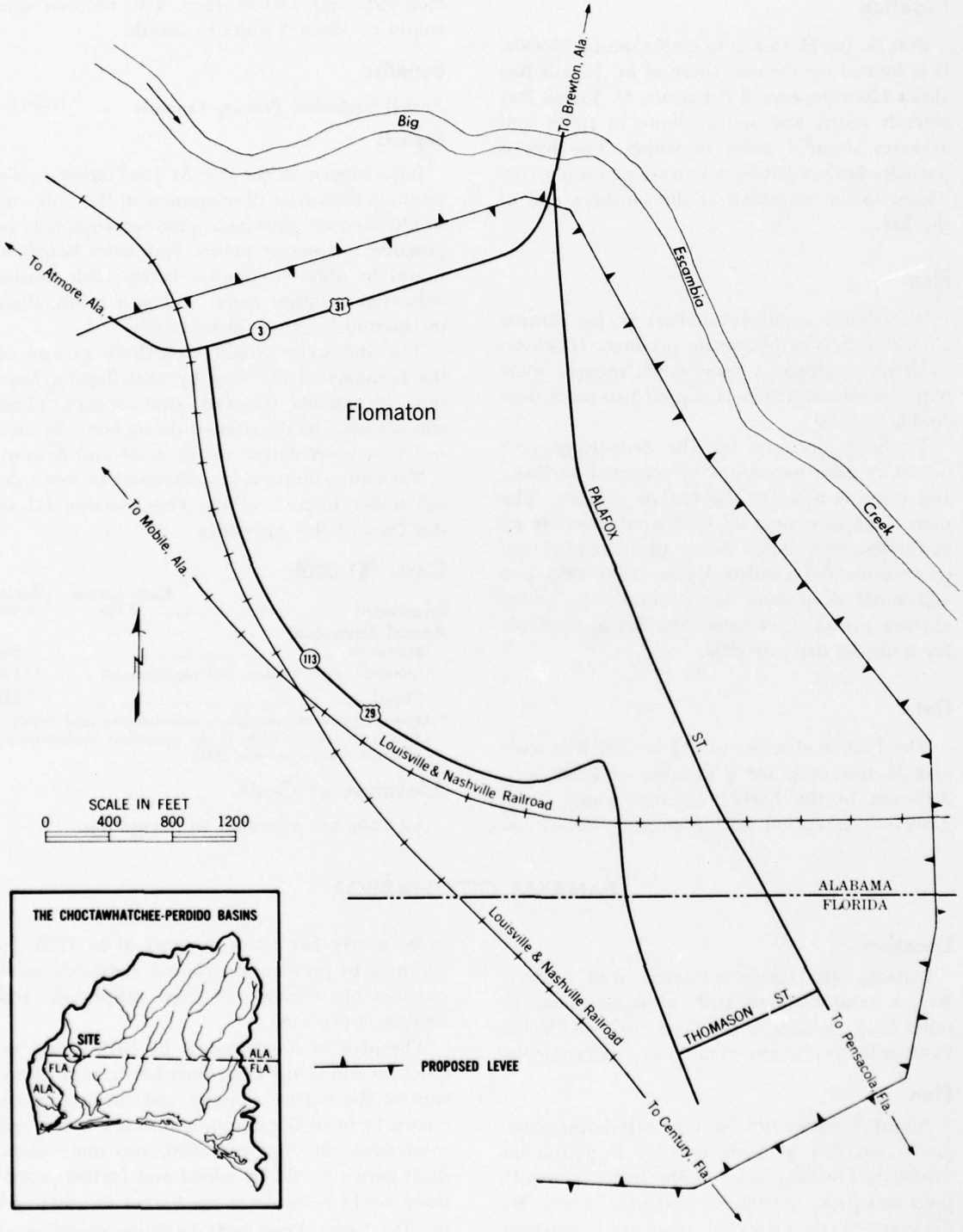


Figure 4.6

PORT ST. JOE HARBOR

Location

Port St. Joe Harbor is in Gulf County, Florida. It is located on the east shore of St. Joseph Bay about 120 miles east of Pensacola. St. Joseph Bay extends north and south about 13 miles and averages about 4 miles in width. The bay is partially landlocked by a narrow peninsula connected to the mainland at the southern end of the bay.

Plan

Waterborne commerce at Port St. Joe consists almost entirely of petroleum products. However, waterway commodity movements include some paper products. Traffic is expected to more than double by 2000.

Traffic projections for the deep-water port would require expansion of terminal facilities and improvements to the harbor channel. The plan of improvement by 1975 would include an additional deep-water berth plus channel improvements and a railroad spur. After 1975, two additional deep-water berths would be added making a total of six deep-water berths available for traffic by the year 2000.

Data

The harbor channel would be 250 feet wide and 35 feet deep for a distance of 2,000 feet. Adjacent to the harbor channel would be a 2,000-foot extension of the turning basin, 750 feet wide and 32 feet deep. The railroad spur would be about 2 miles in length.

Benefits

Annual Equivalent Primary Tangible $1,665,000

Impacts

Improvement of the Port St. Joe Harbor would promote industrial development in the area and would increase petroleum product shipments by pipeline to interior points. Industries benefited would be able to compete better with similar industries in other areas; and as a result, their production level would be raised.

The industries would contribute greatly to the economy of the area by contributing large sums of payrolls, materials, and services. These effects would be distributed throughout the area and to a lesser extent to the State and Nation.

Navigation impacts are discussed in more detail under Impacts of the Plan, Section III of this Part of the Appendix.

Costs ($1,000)

	Early action	Total
Investment	2,338	6,300
Annual Equivalent		
Investment		302
Operation, maintenance, and replacements		*1,140
Total		1,442

* Annual equivalent operation, maintenance, and replacements costs are the same as the operation, maintenance, and replacements at year 2000.

Allocation of Costs

All costs are allocated to navigation.

PANAMA CITY HARBOR

Location

Panama City Harbor is located on St. Andrew Bay, a naturally deep body of water about 10 miles long, parallel to the Gulf coast of Florida Panhandle. It is about 95 miles east of Pensacola.

Plan

About three-fourths of the waterborne commerce handled at Panama City is petroleum products. The remainder of the traffic is mainly pulp and paper, chemicals, and naval stores. By the year 2000 the projected commerce is expected to be nearly five times as great as in 1960. In addition to present waterborne commodities, a considerable tonnage of logs, pulpwood, and lumber is expected.

The plan of improvement by 1975 would require an additional deep-draft berth, plus extension of the harbor channel and turning basin, enlargement of the entrance channel, and a rail connection. By the year 2000, two more deep-draft berths would be added and further extensions would be made to the harbor channel and turning basin. Deep-draft facilities would total

9 with space for 12 vessels upon completion of the plan, in addition to 20 shallow-draft wharves.

Data

The entrance channel would be enlarged to 37 feet deep and 500 feet wide for a distance of 2,000 feet, thence to smaller dimensions in a transition distance of 3,000 feet, where the channel dimensions would become 35 feet deep and 300 feet wide for a distance of 5,000 feet. Turning basin dimensions would be 750 feet wide, 2,000 feet long, and 32 feet deep. Length of the railroad spur would be about one-half mile.

Benefits

Annual Equivalent Primary Tangible $1,690,000

Impacts

The port traffic results in an overall savings in production costs for those industries that use it. These savings are reflected in increased payrolls, increased purchases of materials, and services, contributing to the economy of the area, the State, and the Nation.

Navigation impacts are discussed in more detail in Section III, Impacts of the Plan, of this Part.

Costs ($1,000)

	Early action	Total
Investment	2,214	6,030
Annual Equivalent		
Investment		288
Operation, maintenance, and replacements		*1,150
Total		1,438

* Annual equivalent operation, maintenance, and replacements costs are the same as the operation, maintenance, and replacements costs at year 2000.

Allocation of Costs

All costs are allocated to navigation.

PENSACOLA HARBOR

Location

Pensacola Harbor is on the northwest coast of Florida about 59 miles east of Mobile, Alabama. The city of Pensacola is located on the western shore of Pensacola Bay, an arm of the Gulf of Mexico about 13 miles long and 3½ miles wide, separated from the Gulf by Santa Rosa Island. The main port and terminal facilities are situated along the city waterfront some 7 or 8 miles above the mouth of the bay. The Pensacola Naval Air Station occupies a large area on the western shore of the bay near its entrance to the Gulf.

Plan

About half of the waterborne commerce handled at Pensacola Harbor is petroleum products. This approximate proportion is expected to prevail in the year 2000 when traffic is expected to be more than three times as large as in 1960. The remainder of the traffic is expected to be principally in commodities that include pulp and paper; fertilizer and materials; chemicals; logs, pulpwood, and lumber; cement; and bituminous coal.

The plan provides for increased dimensions of the port of Pensacola entrance and harbor channels by 1975. After 1975 and prior to year 2000, the plan includes an additional deep-draft tanker berth to bring the total terminal facilities to 7 deep-water wharves, 6 shallow-draft piers and wharves for petroleum products, and 4 shallow-draft wharves for general cargo.

Data

Port improvements would modify the existing harbor facilities to provide for (1) maintenance of an entrance channel to dimensions of at least 35 by 500 feet from the Gulf to the southern boundary of the existing aircraft carrier mooring basin in Pensacola Bay; (2) maintenance of a 33- by 300-foot channel along the extreme southern boundary of the mooring basin; (3) provision of a 33- by 300-foot channel between the mooring basin and the main harbor area; (4) enlargement of the two approach channels to dimensions of 33 by 300 feet; and (5) enlargement of the inner-harbor channel to provide a maneuvering area parallel to the pierhead line generally 4,000 feet long, 500 feet wide, and 33 feet deep.

Benefits

Annual Equivalent Primary Tangible $397,000

Impacts

Improvements for the accommodation of larger vessels, or vessels loaded to greater drafts, would encourage a greater number of ships engaged in foreign and coastwise trade to provide regular shipping service to Pensacola. This, in turn, would enable shippers to use Pensacola more often for movements which, because of present infrequency of foreign and coastwise sailings, must be shipped through other ports. A resulting saving in overland transportation charges would thereby be realized.

Navigation impacts are discussed in more detail in Section III, Impacts of the Plan, of this Part.

Costs ($1,000)

	Early action	Total
Investment	424	2,221
Annual Equivalent		
Investment		81
Operation, maintenance, and replacements		•188
Total		269

• Annual equivalent operation, maintenance, and replacements costs are the same as the operation, maintenance, and replacements costs at year 2000.

Allocation of Costs

All costs are allocated to navigation.

GULF COUNTY CANAL

Location

The Gulf County Canal is in Gulf County on the coast of the Panhandle of Florida. It is a navigable channel about 6 miles long, connecting the main channel of the Gulf Intracoastal Waterway with St. Joseph Bay near Port St. Joe, Florida.

Plan

The plan provides for enlarging the Gulf County Canal from 9 feet deep by 100 feet wide to the dimensions of the Gulf Intracoastal Waterway which is 12 feet deep by 125 feet wide. This enlargement would permit towing equipment operating on the Intracoastal Waterway to serve the harbor of Port St. Joe, Florida.

Benefits

Annual Equivalent Primary Tangible $48,000

Impacts

Navigation impacts are discussed in more detail in Section III, Impacts of the Plan, of this Part.

Costs ($1,000)

	Early action	Total
Investment	539	539
Annual Equivalent		
Investment		19
Operation, maintenance, and replacements		•22
Total		41

• Annual equivalent operation, maintenance, and replacements costs are the same as the operation, maintenance, and replacements costs at year 2000.

Allocation of Costs

All costs are allocated to navigation.

PERDIDO PASS

Location

Perdido Pass, Alabama, is located about midway between Mobile Bay, Alabama, and Pensacola Bay, Florida. Perdido Bay, which empties into the Gulf of Mexico through Perdido Pass, is about 13 miles long and from 1 to 3 miles wide with depths ranging up to 16 feet. The pass is a natural inlet about 900 feet wide and 3,000 feet long. The controlling depth of the natural channel in the pass is about 4 feet.

Plan

The improvement of Perdido Pass would consist of a stabilized Gulf entrance and an enlargement of the existing channel.

Data

Stabilization of the Gulf entrance would be accomplished by twin rubble mound jetties extending from the shoreline to the 15-foot depth contour in the Gulf. The channel improvement

for Perdido Pass consists of enlargement of the natural channel dimensions to 150 feet wide and 15 feet deep to the highway bridge over the pass; thence, a channel with dimensions of 100 feet wide and 9 feet deep northeast into Perdido Bay and northwest into Terry Cove.

Benefits

Annual Equivalent Primary Tangible $97,000

Impacts

The Perdido Pass project would provide benefits to small craft using the pass. Removal of the bar obstructing the natural channel and rendering it safe for navigation is expected to have a stimulating effect on the commercial fishing industry and its further development in the area and to recreationists. Economic impacts from the project would stem from this subsequent development as well as the primary benefits such as savings in lost time, boat damage, and quicker access to market.

Navigation impacts are discussed in more detail in Section III, Impacts of the Plan, of this Part.

Costs ($1,000)

	Early action	Total
Investment	1,400	1,400
Annual Equivalent		
Investment		51
Operation, maintenance, and replacements		20
Total		71

* Annual equivalent operation, maintenance, and replacements costs are the same as the operation, maintenance, and replacements costs at year 2000.

Allocation of Costs

All costs are allocated to navigation.

WATER SUPPLIES

Location

The water supply program would be basinwide.

Plan

The program for domestic, municipal, and industrial uses of water include the development or improvement of water supplies, treatment facilities, and distribution systems. Water made available under the program would serve domestic needs for 22.7 million gallons per day, municipal needs for 258 million gallons per day, and industrial needs for 769 million gallons per day by the year 2000.

Data

	Number
Domestic Supplies	
New drilled wells	3,600
Wells sealed and covered	25,000
Power pumps and pressure installations	5,000
Rehabilitation of wells	50,400
Municipal Supplies	
Municipalities	114
Improvement of systems	
Source	64
Water treatment	64
Elevated storage tanks	65
Distribution systems or extensions	105

The industrial water supply program would consist of the installation of new wells, surface water intakes, treatment plants and storage facilities, and expansion of municipal distribution systems for some of the industrial plants located in the basins.

Benefits

Tangible benefits are assumed to be at least equal to the cost of the cheapest alternative and are not expressed in monetary terms.

Impacts

The construction and installation of the facilities to supply water would provide employment and income for many basins residents, as well as sales of construction equipment and supplies. Some employment and sales and services of supplies and equipment during the operation and maintenance of the projects would result in local benefits.

The availability of good quality water determines to a considerable extent the degree of community and industrial development. Some industries consider an ample supply of good water a major factor influencing the location of its plants. Industry is attracted to areas where, in addition to other considerations, high-quality water is available in sufficient volumes to meet its requirements.

A properly designed and operated water supply protects the health of the community and strengthens its fire defenses. It contributes to recreational activities by providing water for swimming pools, parks, playgrounds, golf courses, and gardens and lawns.

Water supply benefits are measured by assuming that the value of water in adequate quantity and quality to the users is equal to the cost of obtaining water of similar quality from the most likely alternative source. In general, ground water sources are the most likely alternatives because of adequately yielding aquifers. Therefore, benefits from additional ground water sources are generally considered to be equal to the cost of obtaining water from ground water. This is sufficient to justify the costs but results in a conservatively low estimate of the value of water supply benefits. Eventually, expanded drawdown cones are expected to increase ground water pumping costs to the point where surface supplies may be more economical for some communities.

Costs ($1,000)

	Alabama	Florida	Total
Investment			
Early action			
Domestic	3,370	6,530	9,900
Municipal	5,770	20,290	26,060
Industrial	2,170	5,490	7,660
Total	11,310	32,310	43,620
Total			
Domestic	3,370	6,530	9,900
Municipal	13,400	69,000	82,400
Industrial	9,800	16,600	26,400
Total	26,570	92,130	118,700
Annual Equivalent			
Investment			
Domestic	100	196	296
Municipal	310	1,486	1,796
Industrial	202	364	566
Total	612	2,046	2,658
Operation, maintenance, and replacements			
Domestic	59	114	173
Municipal	1,109	4,263	5,372
Industrial	790	3,347	4,137
Total	1,958	7,724	9,682
Total			
Domestic	159	310	469
Municipal	1,419	5,749	7,168
Industrial	992	3,711	4,703
Total	2,570	9,770	12,340
Operation, Maintenance, and Replacements at Year 2000			
Domestic	161	312	473
Municipal	1,920	8,150	10,070
Industrial	1,449	6,278	7,727
Total	3,530	14,740	18,270

Allocation of Costs

All costs are allocated to water supplies.

RECLAMATION, IRRIGATION, AND DRAINAGE

Location

The reclamation, irrigation, and drainage programs would be carried out on irrigable areas of the basins used for cropland, and on wetland areas of the basins used for cropland and pastureland. Drainage of woodland is discussed under Forest Conservation and Utilization.

Plan

The reclamation, irrigation, and drainage programs summarized in this Section are not included elsewhere in this Appendix. Drainage in upstream areas is included in the upstream watershed projects.

The features of the irrigation program by the year 2000 include individual sprinkler systems on an individual farm basis to irrigate an estimated 10,000 additional acres of cropland requiring 6,000 acre-feet of water annually. Irrigation of home gardens, nurseries, lawns, and nonagricultural areas would be in addition to the cropland acres. About 32 percent of the water supply requirements will be provided by farm ponds and the remaining 68 percent from individual wells and streams. Crops to be irrigated include tobacco, cotton, truck crops, corn, and speciality crops. The irrigated acres would require a high level of conservation treatment for protection and efficient use.

The features of the drainage program include onfarm open ditch drainage systems on an estimated 13,000 additional acres of cropland and pastureland. Crops to be grown on drained land include tobacco, corn, cotton, peanuts, truck and other speciality crops, and pasture.

Individual farmers are expected to install the irrigation and drainage systems with technical and financial assistance provided by private concerns and State and Federal programs.

Benefits

Annual Returns to Farmers ($1,000)

	Alabama	Florida	Total
Irrigation	454	104	558
Drainage	109	32	141
Total	563	136	699

Impacts

Irrigation would provide insurance against drought conditions and assist in prompt germination and continuous plant growth of new seedlings. The survival of transplanted material and the maturing of crops would help in establishing vegetative cover on eroded areas and would provide for better use of land in accordance with its capability. Drainage also would provide for improved land preparation, seeding, cultivation, management, and harvesting.

Costs (exclusive of technical assistance) ($1,000)

	Alabama	Florida	Total
Investment			
Early action			
Irrigation	498	105	603
Drainage	56	17	73
Total	554	122	676
Total			
Irrigation	1,035	223	1,258
Drainage	143	45	188
Total	1,178	268	1,446
Annual Equivalent			
Irrigation			
Investment	37	8	45
Operation, maintenance, and replacements	177	38	215
Total	214	46	260
Drainage			
Investment	5	2	7
Operation, maintenance, and replacements*	10	6	16
Total	15	8	23
Summary			
Irrigation and drainage			
Investment	42	10	52
Operation, maintenance and replacements*	187	44	231
Total	229	54	283

* Annual equivalent operation, maintenance, and replacements costs are assumed to be equal to the operation, maintenance, and replacements costs at year 2000.

Allocation of Costs

All costs are allocated to irrigation and drainage as shown.

HYDROELECTRIC POWER AND INDUSTRIAL DEVELOPMENT

The electric energy and power requirements in the basins are projected to total about 17.3 billion kilowatt-hours with a demand of about 3.1 million kilowatts by the year 2000. Three small hydroelectric powerplants with a combined capacity of 9,100 kilowatts are operating in the basins. The proposed Crestview dam and reservoir on the Yellow River, upstream from U. S. Highway No. 90, would support a 47,000-kilowatt capacity hydroelectric powerplant that would generate about 53 million kilowatt-hours annually. This capacity and energy would be used largely for peaking purposes. It is expected that increases in electric load would be met by construction of additional thermal-electric powerplants in and adjacent to the basins near fuel or cooling water supplies. Transmission and distribution systems would be expanded as required to meet the electric loads.

The Florida Gulf coast between Pensacola and Panama City offers an excellent opportunity for people desiring to retire and for recreational

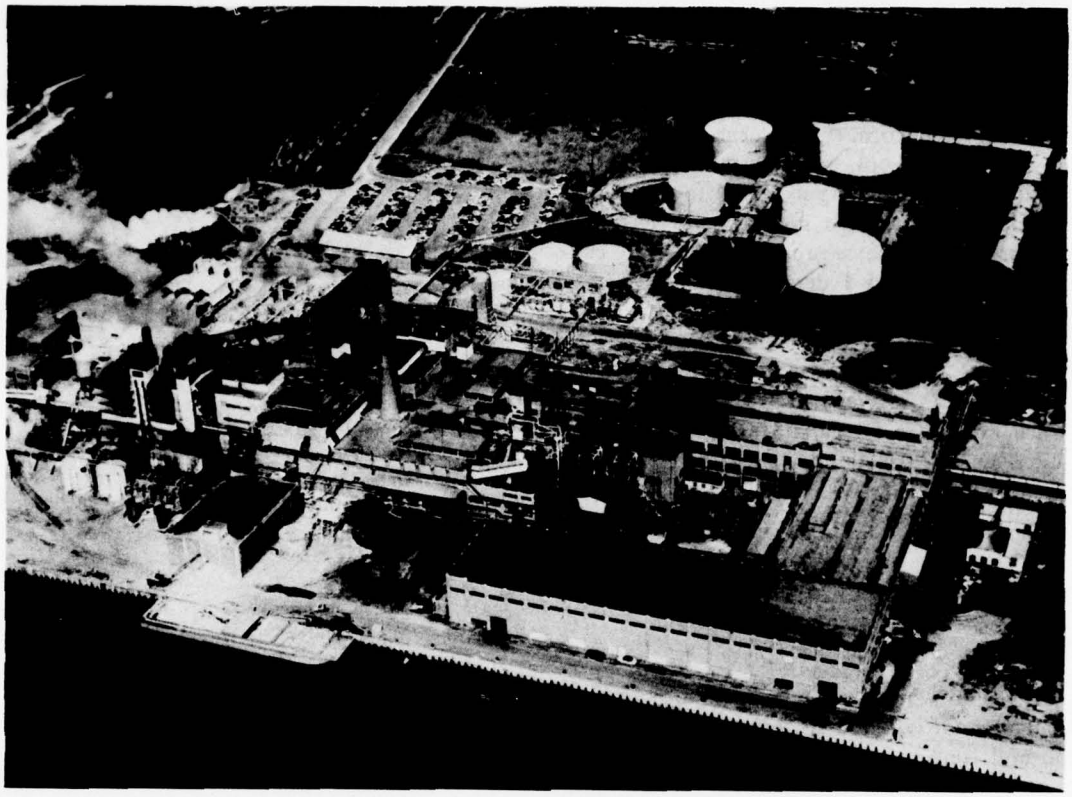


Figure 4.7 *Growth Is Expected in the Pulp and Paper Industries in the Basins — Port St. Joe, Florida.*

development. Associated with such developments are numerous trade and service-type industries which furnish numerous jobs. It is estimated that the manufacturing segment of the economy will provide an average of about 1,300 new jobs per year, and the trades, services, government, construction, and other nonmanufacturing activities will provide about 7,000 new jobs per year through the year 2000.

Much of the industrial growth anticipated for these basins is oriented to military establishments in the Florida portion and to existing manufacturing in or near Pensacola and Panama City. At present, the largest industries in terms of employment in the basins are apparels, chemicals, lumber and wood products, pulp and paper, and metals, in that order. By the year 2000, these types will probably still dominate the industrial picture with a slight rearrangement of order — apparels, metals, chemicals, pulp and paper, and lumber and wood products. All five categories are expected to increase substantially in number of employees. The only existing industry expected to decline in employment is textiles, particularly in woven fabric.

Three of the above industries, chemicals, pulp and paper, and lumber and wood products, are resource oriented. The present chemical industries rely heavily on either the gum and wood resources or on petrochemicals. These industries, however, are passing through a transition from resource orientation to market orientation. Growth in these industries should continue to gain, particularly with the advantages of three deep-water ports, the Gulf Intracoastal Waterway, and excellent quality of water supply.

Increase in forest production through forest conservation and management will insure increases in the pulp and paper, lumber and wood products, and part of the chemical industries.

Other industry types expected to increase are food processing; printing and publishing; stone, clay, and glass; petroleum refining; and aircraft parts.

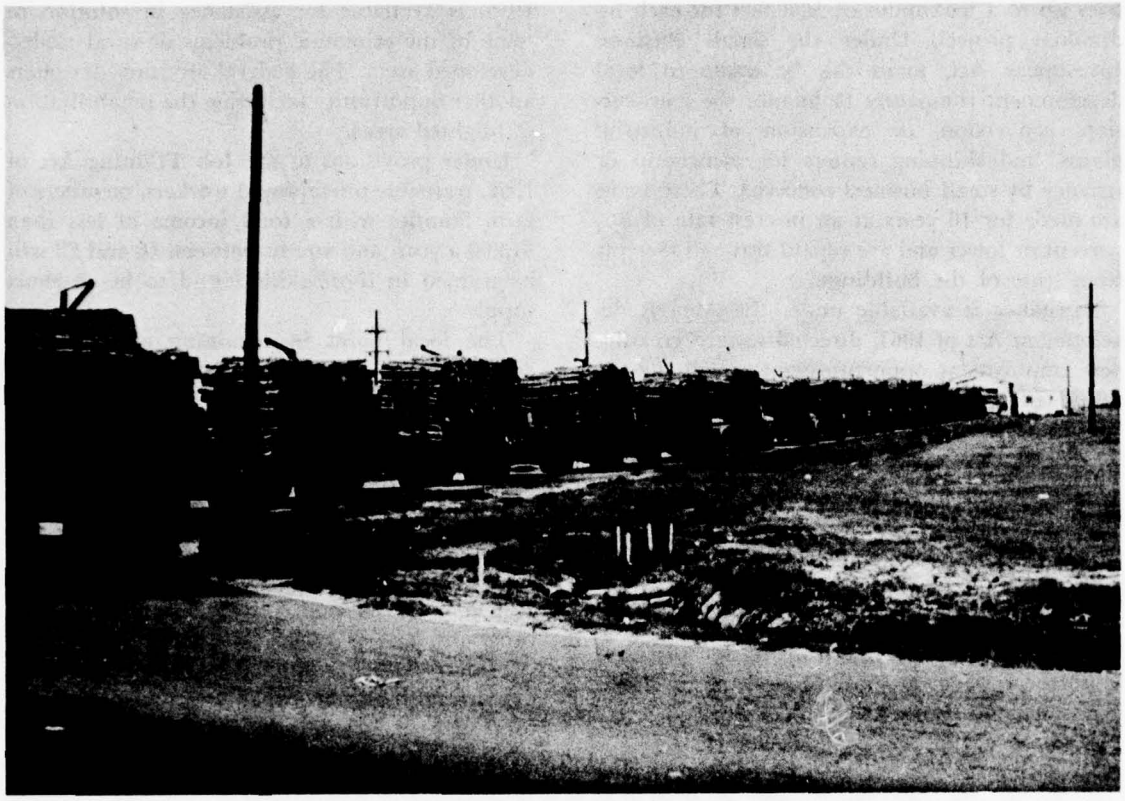


Figure 4.8 *Many Truckloads of Pulpwood Are Required for Papermill at Cantonment, 15 Miles North of Pensacola, Florida.*

The overall effect of increases in employment possibilities from manufacturing are very far reaching. Other segments of the economy, notably retail and wholesale trades, services, construction, and government will increase as much as 5 to 1. This is a larger projected ratio than any of the other basins of the Southeast River Basins and can be attributed also to the influence of potential recreation activities. Because of this diversity of economic activity and change of mix to higher paying kinds of employment, the per capita income by 2000 is expected to increase appreciably. The Florida portion of the basins should have, by 2000, the highest rate of increase in per capita income in the entire Southeast River Basins area. This projected per capita income of $5,552 is nearly eight times as large as the 1960 per capita income.

Expansion in industrial development in the basins depends on many factors. The more important factors are the availability of raw materials, markets, labor, power, and transportation facilities. Others are climate, taxes, governmental cooperation, land availability, financing, community facilities, and community attitude. When all factors are considered and balanced, community attitude is possibly the most important deciding factor.

Community attitude is best expressed through local organizations for industrial development. Types of local organizations include: Chambers of commerce, county development authorities, development committees, and development corporations. The success of any organization depends upon the resourcefulness, energy, goals, enthusiasm, attitudes, objectivity, tools, leadership, and judgment of the people in the organization.

Assistance is available from many sources in solving problems of economic development including private consultants, universities, and many State and Federal agencies.

The Small Business Administration can lend 80 percent of the cost of establishing new indus-

tries up to a maximum of $250,000 for each individual project. Under the Small Business Investment Act, loans can be made to local development companies to finance the construction, conversion, or expansion of industrial plants, and shipping centers for ownership or tenancy by small business concerns. These loans are made for 10 years at an interest rate of 5½ percent or lower and are repaid through receipts from lease of the buildings.

Assistance is available under the Area Redevelopment Act of 1961, directed toward creating new employment opportunities through the development of facilities and resources. Also, the Rural Areas Development Program, formerly the Rural Development Program established in 1955, is available for assistance in solution of some of the economic problems of rural underdeveloped areas. The Federal Housing Act offers another opportunity including the rehabilitation of blighted areas.

Under provisions of the Job Training Act of 1962, trainable unemployed workers, members of farm families with a total income of less than $1,200 a year, and youths between 16 and 22 will be trained in those skills found to be in short supply.

The focal point in obtaining and utilizing assistance under these programs lies with local groups organized to delineate effectively the community interest and initiate action toward obtaining these objectives.

SOIL CONSERVATION AND UTILIZATION

Location

The soil conservation and utilization program would be carried out on cropland, pastureland, and rangeland throughout the basins.

Plan

Features of the soil conservation and utilization plan for the Choctawhatchee-Perdido basins include:

(1) The treatment of about 941,000 acres of cropland, pastureland, and rangeland by the installation of annual and enduring soil conservation measures and practices, including the establishment or reestablishment of vegetative cover, the improvement of vegetative cover, erosion control practices, management of grazing, and protection from fire.

(2) The installation of about 6,900 farm ponds from 1960 to the year 2000 to provide for livestock water and irrigation water supply, and small impoundments to provide fishing and some unclassified recreation use.

(3) The conversion of about 184,000 acres of woodland, pastureland, and other lands to cropland, and 244,000 acres of cropland, woodland, and other lands to pastureland.

Land owners and operators will install the above measures on an individual farm basis and in upstream watershed projects with technical and financial assistance from State and Federal programs.

Pressure is being applied to competitive land uses in the basins by expanding nonagricultural uses such as urban and industrial areas and highways. It is estimated that some 364,000 acres now used for agricultural production will be diverted to such nonagricultural uses by the year 2000. The erosion control and water management problems on these lands will require similar treatment measures as for cropland and pastureland and will be applied by private individuals, industries, and local and State entities. At the time these areas are changed into nonagricultural use, the specific problems and solutions will need to be determined and means established to carry out the control measures.

Data

Land Use – 2000

	Acres (1,000)
Cropland and pastureland	2,166
Woodland	5,905
Other	970
Total	9,041

Benefits

Annual Returns to Farmers ($1,000)

	Alabama	Florida	Total
Total	2,924	823	3,747

Impacts

Installation of soil conservation measures and practices on the areas of cropland, pastureland, and rangeland needing conservation treatment is a basic principle in protecting the soil resources and in providing sustained agricultural production in the basins and Nation. The application of these practices and measures would contribute to extending the life of floodwater retarding structures, major reservoirs, and drainage ditches by reducing sediment. By improving water quality, they would reduce the cost of treatment for municipal and industrial use and enhance the value of the reservoirs for fish and wildlife.

Costs (exclusive of technical assistance) ($1,000)

	Alabama	Florida	Total
Investment			
Early action	7,600	2,200	9,800
Total	20,010	5,890	25,900
Annual Equivalent			
Investment	723	213	936
Operation, maintenance, and replacements	1,458	424	*1,882
Total	2,181	637	2,818

*Annual equivalent operation, maintenance, and replacements costs are the same as the operation, maintenance, and replacements costs at year 2000.

Allocation of Costs

All costs are allocated to soil conservation and utilization.

FOREST CONSERVATION AND UTILIZATION

Location

The forest conservation and utilization program would be carried out on the woodland areas throughout the basins including 84,000 acres in the Conecuh National Forest and 426,000 acres in Eglin Air Force Base.

Plan

The forestry program would include items such as: (1) Technical assistance for managing and harvesting timber and for applying other recommended measures; (2) commercial and noncommercial thinnings to help bring stands to operable conditions; (3) tree planting and site preparation for natural regeneration and seeding; (4) detecting and controlling insect and disease infestations; (5) water management by drainage and flood control; (6) forest fire protection by providing needed additional facilities such as towers and tractors and by increasing air observation and the number of personnel assigned to detection and suppression activities; (7) fencing overgrazed woodland areas to control grazing and prevent damage to tree seedlings by cattle; (8) road building for management and protection activities; (9) additional education and information; and (10) intensified forest research.

Data

Item	Unit	Alabama	Florida	Total
Fencing for woodland grazing control	mile	800	2,100	2,900
Erosion control tree planting	acre	99,000	19,000	118,000
Woodland drainage and water control	acre	85,000	145,000	230,000
Shelterbelts	acre	3,200	400	3,600
Timber-stand improvement (commercial and noncommercial)	acre	3,038,000	2,672,000	5,710,000
Other tree planting and site preparation for natural reproduction	acre	2,181,000	1,919,000	4,100,000
Annual Production — 2000				
Timber cut (million)	cu. ft.	192	169	361
Gum naval stores (thousand)	bbl.	16	28	44

Benefits

Annual Equivalent Primary Tangible ($1,000)

Alabama	3,938
Florida	3,464
Total	7,402

Impacts

Forestry impacts are discussed in Section III, Impacts of the Plan, of this Part.

Costs ($1,000)

	Alabama	Florida	Total
Investment			
Early action			
Fencing for woodland grazing control	280	630	910
Erosion control tree planting	2,465	474	2,939
Water control and forest roads	3,512	2,825	6,337
Shelterbelts	48	6	54
Timber-stand improvement (commercial and noncommercial)	2,316	2,044	4,360
Other tree planting and site preparation for natural regeneration	14,730	13,000	27,730
Total	23,351	18,979	42,330
Total			
Fencing for woodland grazing control	280	630	910
Erosion control	2,465	474	2,939
Water control and forest roads	4,187	3,910	8,097
Shelterbelts	48	6	54
Timber-stand improvement (commercial and noncommercial)	10,640	9,360	20,000
Other tree planting and site preparation for natural regeneration	36,320	31,870	68,100
Total	53,850	46,250	100,100
Annual Equivalent			
Investment	1,240	1,064	2,304
Operation, maintenance, and replacements	880	682	1,562
Total	2,120	1,746	3,866
Operation, Maintenance, and Replacements at Year 2000	1,100	907	2,007

Allocation of Costs

All costs are allocated to forest conservation and utilization.

FISH AND WILDLIFE

Location

The single-purpose wildlife and sport fisheries programs would be basinwide. The commercial fisheries program is located in the Gulf coastal areas. Fish and wildlife facilities included in multiple-purpose projects are described as part of specific projects.

Plan

The multiple-purpose projects at Ariton, Crestview, and Deadening Lakes; the water-access areas; and the fishing lakes include those parts of the fish and wildlife program accounted for at each project.

The features of the wildlife program are: (1) Habitat improvement in the existing State administered wildlife management areas; (2) further development of wildlife habitat within the Conecuh National Forest in Alabama, and the military areas in Alabama and Florida, so that the wildlife potentials of these areas may be more fully realized; (3) establishment and development of 19 additional wildlife management areas in Alabama and 3 additional areas in Florida; (4) the leasing and management of 4,100 acres of cultivated fields for dove hunting in accordance with practices approved by the conservation agencies; (5) development of wildlife habitat throughout the basins by interested landowners in cooperation with State and Federal conservation agencies; (6) development of the Escambia River marshes for waterfowl purposes; and (7) the expansion of current activities in research, planning, education and information, management, and enforcement.

The features of the fresh-water sport fisheries program are: (1) Improvement of the existing streams for fishing; (2) provision of access areas on the streams; (3) renovation and more intensive management of existing and prospective large and small impoundments; and (4) expansion and acceleration of current activities in research, planning, education, protection, and management.

The marine waters of the basins would be capable of producing several times the amount of game fish which will be needed to meet projected requirements provided the inshore waters are protected against pollution, landfills, dredg-

ing, and other activities which are detrimental to fish production and utilization. The salt-water sport fisheries program thus would emphasize those measures which would bring fish and fishermen together. The features of the salt-water fisheries program are: (1) Forty-two submerged fishing reefs would be developed offshore; (2) 10 fishing piers would be constructed; (3) jetties and breakwater structures constructed in the future would be equipped with walkways and handrails to promote safe use; (4) navigational aids would be erected to guide sport fishermen to the most productive drops or reefs; and (5) maps and information concerning available facilities and fishing opportunity would be prepared and disseminated.

The commercial fisheries improvement would consist of: (1) Expansion of existing operations, (2) rehabilitation of oyster producing reefs, (3) cultivation of shrimp, pompano, and other high quality seafoods under controlled conditions, and (4) acceleration and expansion of existing facilities and activities with a view toward more efficient harvests, better methods of handling and processing the catch, new sources of supply, sound regulations and enforcement, and increasing demand for domestic products. With these improvements in effect and the advantages of improved technologies, it is anticipated that the total production of seafoods will be about 23.9 million pounds annually by 2000, an increase of about 12.6 million pounds over the 1960 harvest.

Data

	Unit	Alabama	Florida	Total
Wildlife				
Improvement of existing facilities				
State administered lands	acre	85,000	384,000	469,000
Federally administered lands				
Conecuh National Forest	acre	84,000	0	84,000
Military areas	acre	53,000	447,000	500,000
Development of new wildlife management areas				
State administered	acre	475,000	215,000	690,000
Dove fields	acre	2,600	1,500	4,100
Coastal wetlands	acre	0	10,000	10,000
Extensive habitat improvement			Basinwide	
Supporting programs (research, investigation, education, enforcement, services)			Basinwide	
Annual use (projected increase at 2000, over 1960)				
Hunting (thousand)	user-day	382	797	1,179
Fresh-Water Sport Fisheries				
Improvement of existing facilities				
Streams	acre	6,800	8,000	14,800
Large impoundments	acre	4,500	13,000	17,500
Small impoundments	acre	4,500	8,000	13,500
Development of new waters				
Small impoundments	acre	0	6,600	6,600
Supporting programs			Basinwide	
Annual use (projected increase at 2000, over 1960)				
Fresh-water angling (thousand)	user-day	396	1,710	2,106
Salt-Water Sport Fisheries				
New separate facilities				
Submerged fishing reefs*	reef	2	40	42
Fishing piers	pier	0	10	10
Supporting programs			Coastwide	
Annual use (projected increase at 2000, over 1960)				
Salt-water angling (thousand)	user-day	82	3,511	3,593

* The reefs would be 3 to 4 feet high in water with depths varying from 20 to 60 feet.

Commercial Fisheries

Supporting commercial fishery activities would consist of: (1) Expansion of fishing operations, (2) exploratory fishing and gear development, (3) market development, (4) technological services, (5) biological studies, (6) protection of habitat, and (7) enforcement of regulations. By the year 2000, the increased production associated with these improved activities is as follows:

	Pounds (1,000)		
	Alabama	Florida	Total
Food fishes	0	12,130	12,130
Industrial fishes	0	170	170
Seafood culture			
Oysters (500 acres)	0	200	200
Shrimp (100 acres)	0	80	80
Total	0	12,580	12,580

Benefits

Annual Equivalent Primary Tangible ($1,000)

	Alabama	Florida	Total
Wildlife and sport fisheries			
Wildlife	709	1,203	1,912
Fresh-water sport fisheries	386	1,506	1,892
Salt-water sport fisheries	47	1,874	1,921
Subtotal	1,142	4,583	5,725
Commercial fisheries			
Expansion of operations	0	805	805
Seafood culture	0	52	52
Subtotal	0	857	857
Total	1,142	5,440	6,582

Impacts

Appreciable benefits would be derived from general enhancement of the recreational opportunities in a given locality. The growth of many towns and cities in this portion of the Southeast will depend to a great extent on their attractiveness and proximity to land and water affording good hunting and fishing.

The benefits which could be realized by improving seafood culture and harvests would be enough to justify a vigorous effort to expand the industry. Improved seafood culture would greatly eliminate the seasonsal fluctuations of supply and would encourage new fish processing plants to locate in the basins. Stabilization of supply and market conditions would attract energetic young men into the field of commercial fishing. Secondary benefits include increased employment in the fish and other seafood processing industries, in boat building, boat maintenance, and in boat-supply enterprises. More services would be required and sales of food, gasoline, oil, fishing supplies, and other equipment would increase.

Fish and wildlife impacts are discussed in more detail in Section III, Impacts of the Plan, of this Part.

Costs ($1,000)

	Alabama	Florida	Total
Investment			
Early action			
Wildlife	300	1,215	1,515
Fresh-water sport fisheries	0	0	0
Salt-water sport fisheries	0	900	900
Subtotal	300	2,115	2,415
Commercial fisheries	0	85	85
Total	300	2,200	2,500
Total			
Wildlife	475	1,215	1,690
Fresh-water sport fisheries	0	3,312	3,312
Salt-water sport fisheries	40	1,800	1,840
Subtotal	515	6,327	6,842
Commercial fisheries	0	170	170
Total	515	6,497	7,012
Annual Equivalent			
Total			
Wildlife and sport fisheries			
Investment	13	138	151
Operation, maintenance, and replacements	662	1,448	2,110
Subtotal	675	1,586	2,261
Commercial fisheries			
Investment	0	4	4
Operation, maintenance, and replacements	0	334	334
Subtotal	0	338	338
Total	675	1,924	2,599
Operation, Maintenance, and Replacements at Year 2000			
Wildlife and sport fisheries	1,444	5,483	6,927
Commercial fisheries	0	1,329	1,329
Total	1,444	6,812	8,256

Summary of Costs ($1,000)

	Investment	Annual equivalent		OM&R at year 2000
		Total	OM&R	
Wildlife and sport fisheries	6,842	2,261	2,110	6,927
Commercial fisheries	170	338	334	1,329
Total	7,012	2,599	2,444	8,256

Allocation of Costs

All costs are allocated to fish and wildlife.

Special Considerations

Many oysterbed areas now closed due to pollution could be restored when adequate pollution abatement programs are installed.

RECREATION

Location

The recreation developments would be distributed throughout the basins.

Plan

Summarized are only those parts of the recreation program not included elsewhere in this Appendix. Fish and wildlife programs summarize hunting and sport fishing, and multiple-purpose projects include those parts of the recreation program which are accounted for at each multiple-purpose project.

The area is undergoing rapid changes and much competition is developing for use of land suitable for recreation in the form of motels, cottages, parks, defense installations, roads, and high-density recreation areas. Of the approximately 350 miles of sand beach, about 15 percent is restricted because of military or navigational use. A large part of the coast should be kept available for the public. About 75 percent of the outdoor recreation use in the basins is expected to develop along the coast. By the year 1975 there would be a demand for about 6 million user-days of recreation in addition to the use in 1960. This is expected to increase to more than 27 million user-days in addition to the use in 1960 by the year 2000. Projected data have been developed on user-days and the expected development of beach facilities for the coastal counties.

Baldwin County, Alabama, has approximately 10 miles of beach within the basins and includes Gulf State Park. Over 500,000 people visited the park in 1959. Facilities are expected to be provided for 2 million user-days by 1975 and 4 million user-days by 2000. Additional land would be required and facilities for family and group camping, swimming, picnicking, and cultural activities would be provided.

Escambia County, Florida, has over 40 miles of beach. Superb opportunities exist for large numbers of recreationists. The beaches have been divided into four major sections as follows: (1) The area southwest of Pensacola; (2) Fort Pickens State Park; (3) Pensacola Beach; and (4) the remainder of Santa Rosa Island in Escambia County. Facilities would be furnished for more than 2.7 million user-days by 1975 and 7.5 million user-days by 2000. Some additional land would be provided and facilities for swimming, picnicking, and camping would be developed to meet the increasing demands.

Okaloosa County, Florida, has about 25 miles of beach. The reach contains the John C. Beasley State Park, Fort Walton Beach, and areas reserved for national defense. Additional facilities for swimming, picnicking, sightseeing, and camping would be furnished for 2.5 million user-days by 1975 and for 6.5 million user-days by 2000.

Walton County, Florida, has over 20 miles of beach. Facilities would be provided for 1 million user-days by 1975 and for 4 million user-days by 2000. Areas along this reach of coast are adaptable to high-density use.

Bay County, Florida, has about 45 miles of beach coastline which is broken by St. Andrew Bay at Panama City. St. Andrew State Park is located on the western side of the entrance to St. Andrew Bay. Large defense establishments, principally Tyndall Air Force Base, dominate the eastern side of the bay. High-density use of the entire beach area is expected to require facilities for 2.5 million user-days by 1975 and for nearly 7.5 million user-days by 2000.

The portion of Gulf County, Florida, within the basins has about 7 miles of beach. Use of

the area is expected to require facilities for 1 million user-days by 1975 and for 3.5 million user-days by 2000.

There are many rivers of natural interest and the rolling countryside can be adapted to general outdoor recreation use. Many areas in the basins would lend themselves to development for most projected needs. Some of the areas, where developments appear to be more desirable, are discussed and summarized below and are illustrative of what is considered to be reasonable for such development.

Falling Waters is a scenic waterfall located about 4 miles south of Chipley in Washington County, Florida. The falls have been acquired recently by the State of Florida for development as a State park. Facilities would be furnished for 60,000 user-days by 1975 and for 200,000 user-days by 2000.

Morrison Spring is a spring-fed lake in Walton County, Florida, near the eastern county boundary. It is proposed that 500 acres be acquired around the lake and that facilities be developed which would accommodate 25,000 user-days annually by 1975 and 50,000 user-days by 2000.

Naval Live Oak area is a 1,337-acre tract declared surplus by the Department of Defense. Eventually pending litigation may be resolved and the area transferred to the State of Florida for use as a park. The area is in Santa Rosa County, Florida, between Pensacola Bay and Santa Rosa Island. Swimming, camping, picnicking, and boating opportunities would be developed. Facilities would be provided for 50,000 user-days by 1975 and for 250,000 user-days by 2000.

Gantt Reservoir lies north of Andalusia, Covington County, Alabama, and has a recreation potential. However, use of the reservoir for the cooling water of a steamplant severely limits use for outdoor recreation. The area would provide for 200,000 user-days by 2000.

Eleven inland recreation areas would be developed for those counties in the basins whose residents have need for nearby outdoor recreation opportunity. Such areas would be in Pike County, Alabama, near Troy; in Covington County, Alabama, near Andalusia; in Conecuh County, Alabama, near Evergreen; in Escambia County, Alabama, one near Atmore and the other near Brewton; in Geneva County, Alabama, near Geneva; in Walton County, Florida, near DeFuniak Springs; in Holmes County, Florida, near Bonifay; in Baldwin County, Alabama, near Bay Minette; in Santa Rosa County, Florida, near Jay; and in Crenshaw County, Alabama, in the northern portion. Facilities would be provided for 475,000 user-days by 1975 and 3.3 million user-days by the year 2000.

There are four large areas now owned by public agencies which offer outdoor natural environment type of recreation in the basins. These are Conecuh National Forest in Alabama, Geneva State Forest in Alabama, and Blackwater River State Forest and Pine Log State Forest in Florida. These are discussed and summarized below.

Conecuh National Forest in Covington and Escambia Counties, Alabama, encompasses about 84,000 acres and provided 100,000 user-days of recreation in 1960, largely at the Open Pond area. Additional facilities would be provided for camping, hiking, picnicking, swimming, and cultural activities for 400,000 user-days by 1975 and 1 million user-days by the year 2000. The area is administered by the U. S. Forest Service.

Geneva State Forest is a tract of about 7,000 acres in Geneva County, Alabama. The area has been used for recreation in the past but little has been done to utilize the area since the loss of a dam. The forest would have facilities for 50,000 user-days of outdoor recreation in 1975 and for 300,000 user-days by the year 2000. Activities would be picnicking, hiking, and camping.

Blackwater River State Forest is an area of about 181,000 acres located in Santa Rosa and Okaloosa Counties, Florida. There is limited opportunity for recreation for the present time. Facilities would be provided for 50,000 user-days in 1975 and for 300,000 user-days by the year 2000. These facilities would be primarily for picnicking, hiking, and camping.

Pine Log State Forest is about a 7,000-acre woodland tract in Bay and Washington Counties, Florida. The forest would be developed with facilities for picnicking, hiking, and camping to accommodate 50,000 user-days annually by 1975 and 300,000 user-days by 2000.

Historic and archeologic sites in the basins are typical of sites which would warrant some degree of development.

Fort San Carlos, Fort Barrancas, and Fort Redoubt on Pensacola Bay are now administered by the Department of Defense. The forts have historic signifiicance and are interesting recreation resources. Facilities would be provided to meet the needs for 300,000 user-days of outdoor recreation for the year 2000. Plans for expansion of existing facilities at the Constitution Convention Historic Memorial, located at Port St. Joe, Florida, are included in Appendix 7, Apalachicola-Chattahoochee-Flint Basins.

Three archeological sites have been identified which are of unusual interest. These are: (1) Fort Walton Temple Mound in Fort Walton, Okaloosa County, Florida; (2) Bear Point in Baldwin County, Alabama; and (3) Mitchell Site in Covington County, Alabama. Facilities would be provided for 50,000 user-days by 1975 and for 300,000 by 2000. Interpretive centers, roads, and other service facilities would make these areas attractive to recreationists.

Data

	User-days annually (thousands)		
	1960 Base	Increase 1975-2000	By 2000
Existing Developments			
High density	5,750	21,245	32,960
Baldwin County beaches, Alabama			
Escambia County, Florida			
Gulf Beach; Fort Pickens State Park; Pensacola Beach; Santa Rosa Island			
Okaloosa County beaches, Florida			
Walton County, Florida			
Fort Walton Beach; John C. Beasley State Park			
Bay County, Florida			
St. Andrew State Park			
West Bay County beaches			
East Bay County beaches			
Gulf County beaches, Florida			
General outdoor	200	---	200
Gantt Reservoir, Alabama			
Natural environment	100	1,350	1,900
Conecuh National Forest, Alabama			
Blackwater River State Forest, Florida			
Geneva State Forest, Alabama			
Pine Log State Forest, Florida			
Subtotal	6,050	22,595	35,060
New Developments			
General outdoor	---	3,190	3,800
Falling Waters, Florida; Morrison Spring, Florida; Naval Live Oak, Florida; Eleven county areas, Alabama and Florida			
Historic and cultural	---	550	600
Fort San Carlos, Florida			
Fort Barrancas, Florida			
Fort Redoubt, Florida			
Fort Walton Temple Mound, Florida			
Bear Point, Alabama			
Mitchell Site, Alabama			
Subtotal	---	3,740	4,400
Total	6,050	26,335	39,460

Benefits

Annual Equivalent Primary Tangible ($1,000)

Alabama	5,000
Florida	12,600
Total	17,600

Impacts

The value added to the economy by expenditures made by recreationists is generally recognized. Less tangible are the benefits derived from general enhancement of the recreational opportunities in a given locality. The growth of many cities and towns in the basins will depend to a great extent on their attractiveness and proximity to land and water affording good opportunities for recreation, fishing, and hunting.

Recreation impacts are discussed in more detail in Section III, Impacts of the Plan, of this Part.

Costs ($1,000)

	Alabama	Florida	Total
Investment			
Early action			
Existing areas	7,480	18,240	25,720
New areas	1,330	3,260	4,590
Total	8,810	21,500	30,310
Total			
Existing areas	22,600	63,100	85,700
New areas	4,500	12,500	17,000
Total	27,100	75,600	102,700
Annual Equivalent			
Investment	696	1,678	2,374
Operation, maintenance, and replacements	918	2,588	3,506
Total	1,614	4,266	5,880
Operation, Maintenance, and Replacements at Year 2000	1,725	5,168	6,893

Allocation of Costs

All costs are allocated to recreation.

POLLUTION ABATEMENT AND PUBLIC HEALTH

Location

The pollution abatement and public health programs would be basinwide.

Plan

The program for pollution abatement consists of new and extended sewerage systems and new and enlarged municipal and industrial waste-treatment facilities.

The public health program includes drainage and spraying measures for vector control, collection and disposal of solid waste for fly and rodent control, and air pollution and radiation monitoring.

Data

Pollution Abatement

Municipal sewerage systems	107
Primary plants	23
Secondary plants	84

Public Health

Solid-waste collection and disposal	
Number of sanitary landfill operations	88
Number of incinerators	4
Acres of landfill	1,790
Vector control	Basinwide
Air pollution and radiation monitoring	Basinwide

Benefits

The pollution abatement and public health programs are based primarily on intangibles and benefits are not expressed in monetary terms.

Impacts

The Nation and its communities, as well as business and private operations and individuals, incur losses or damages because of water pollution. The larger share of the total damages is not directly accounted for. The impairment to health, the loss or diminution of fishing and recreational uses, and depreciated property values caused by polluted waters have an adverse economic impact that is diffused throughout society. This reduces the utility of the water resources and restricts economic growth rather than causing a direct dollar loss for corrective devices. These indirect consequences of pollution are not readily expressed in dollar terms because they are diffused and because they are not re-

corded by direct, open-market transactions. Nevertheless, such adverse consequences are real and constitute a handicap to the fulfillment of economic and social goods.

Pollution control measures would alleviate these adverse conditions and produce economic benefits associated with the improved waters. However, these benefits often are not apparent because they constitute insurance for future usefulness, as well as for immediate purposes, or they may be indirect or secondary. Many of the benefits from pollution control are in this nonmarket realm; i.e., enhancement of fishing and recreational opportunity, protection of health, scenic improvement, and assurance of the future utility of water resources for various other purposes. The private market price system, therefore, cannot be relied upon chiefly or solely to provide the measurement. New devices for taking into account the social or public values will need to be devised.

Vector control will not only guard against the spread of vector-borne diseases but also, as in the case of mosquitoes and other swarming and biting insects, it will reduce the mental and physical discomforts caused by these pests. Insect pest control deserves high priority in recreation planning. One vector problem that appears to be on the rise in areas along the eastern seaboard and could be significant in the basins in 1975 and 2000 is mosquito-borne encephalitis. At present, the only feasible approach to the control of encephalitis is a program of prevention through mosquito control.

Improper solid-waste handling breeds flies and rodents which cause diarrhea, dysentery, typhus, and other less common diseases. Good sanitation practices, such as proper storage and collection and disposal of wastes, help control these diseases. Improper disposal also breeds mosquitoes and creates odor nuisances. Open dumps burn and become nuisances and air pollution problems. The proper storage, collection, and disposal of solid wastes will prevent such nuisances and benefit the community. The measures for solid-waste collection and disposal will also have effects far beyond these important public health aspects. By helping to prevent haphazard or uncontrolled waste dumping and burning which spoils the countryside, these measures would add to well-being and help sustain the desirability of the area. In addition, the land created by the fill generally has a value in excess of the original land involved.

Pollution abatement and public health impacts are discussed in more detail in Section III, Impacts of the Plan, of this Part.

Costs

Except for incinerator installations, the investment in the land and equipment required for collection and disposal of solid wastes and for landfill operation are accounted for only in annual equivalent costs. Annual costs shown are those considered necessary to carry out effective basinwide programs.

	Alabama	Florida	Total
Investment ($1,000)			
Early action			
Pollution abatement			
Municipal	19,580	56,340	75,920
Industrial	310	2,160	2,470
Total	19,890	58,500	78,390
Public health*			
Solid waste (incinerator)	---	400	400
Vector control	---	---	---
Air pollution and radiation monitoring	---	---	---
Total	---	400	400
Total			
Pollution abatement			
Municipal	28,600	140,400	169,000
Industrial	700	6,200	6,900
Total	29,300	146,600	175,900
Public health*			
Solid waste (incinerator)	---	2,300	2,300
Vector control	---	---	---
Air pollution and radiation monitoring	---	---	---
Total	---	2,300	2,300
Annual Equivalent ($1,000)			
Pollution abatement			
Investment			
Municipal	751	3,203	3,954
Industrial	16	137	153
Subtotal	767	3,340	4,107
Operation, maintenance, and replacements			
Municipal	191	844	1,035

	Alabama	Florida	Total
Industrial	121	64	185
Subtotal	312	908	1,220
Total	1,079	4,248	5,327
Public health*			
Investment			
Solid waste	---	47	47
Operation, maintenance, and replacements			
Solid waste	483	1,091	1,574
Vector control	226	140	366
Air pollution and radiation monitoring	8	8	16
Subtotal	717	1,239	1,956
Total	717	1,286	2,003

Operation, Maintenance, and Replacements at Year 2000 ($1,000)

	Alabama	Florida	Total
Pollution abatement			
Municipal	307	1,528	1,835
Industrial	205	100	305
Total	512	1,628	2,140
Public health			
Solid waste	686	2,144	2,830
Vector control	226	140	366
Air pollution and radiation monitoring	8	8	16
Total	920	2,292	3,212

* All costs in public health program are shown as OM&R costs except those for installation of incinerators which are shown as investment costs.

Allocation of Costs

All costs are allocated to pollution abatement and public health.

BEACH EROSION CONTROL AND HURRICANE PROTECTION

Location

The coastal areas of the basins fronting on the Gulf include about 150 miles of mainland and barrier-island shorelines from Port St. Joe, Florida, to Gulf State Park, Alabama.

Plan

A cooperative survey would be made to develop needs and solutions of these problems. The survey would consider influences of tides, offshore currents, hazards from hurricanes, winds, and places of immediate danger. The results of Corps of Engineers studies which cover most of the hurricane protection problems in the study area would be utilized.

The Weather Bureau is responsible for furnishing advance warning when a hurricane is approaching and is likely to reach a coastal area. The Weather Bureau also provides information on conditions expected to occur within the hurricane, such as wind speeds, abnormal hurricane tides, probability and extent of flooding, and other pertinent data about the storm.

Evacuation routes would be established over roads, bridges, and causeways. A community hurricane preparedness plan should be prepared by local authorities in cities and communities along the Gulf coast to minimize death and destruction.

Provisions should be made and adopted for establishing and enforcing zoning and building codes, establishing auxiliary power supplies and alternative communication systems, and constructing protective seawalls or similar structures.

An official State agency in Alabama for shore preservation should be established with necessary provisions for State participation in erosion studies and in construction of protective works. The similar State agency in Florida should be utilized fully.

The beach erosion plans developed should be coordinated with plans for channel improvements and maintenance, hurricane protection, recreation, fish and wildlife proposals, and other improvements proposed for the area.

SECTION VI – OTHER PROJECTS CONSIDERED

Many alternative projects and programs were considered in the plan formulation but were not included in the plan. For example, projects for improvement of the Escambia-Conecuh River and the Choctawhatchee River for barge navigation were considered and found physically possible, but not economically justified. Total lift, from the mouth of the Escambia-Conecuh River to Brewton, Alabama, is 65 feet. A waterway terminating at that point would involve three locks and dams with lifts ranging between 14 and 26 feet. To extend the channel to Andalusia would require two additional locks and dams with total lift of 60 feet. The most practicable method of improving the Choctawhatchee River for navigation to Geneva, Alabama, would consist of canalization by construction of four locks and dams, each of about 16-foot lift, supplemented by dredging and snagging in the pools to provide a channel 9 feet deep and at least 150 feet wide.

Appendix 12, Planning, presents more detail on the factors involved in decisions to include or not include project and program features in the basins plan. Some of the more significant items that were eliminated and the reasons for their rejection are shown in the summary that follows.

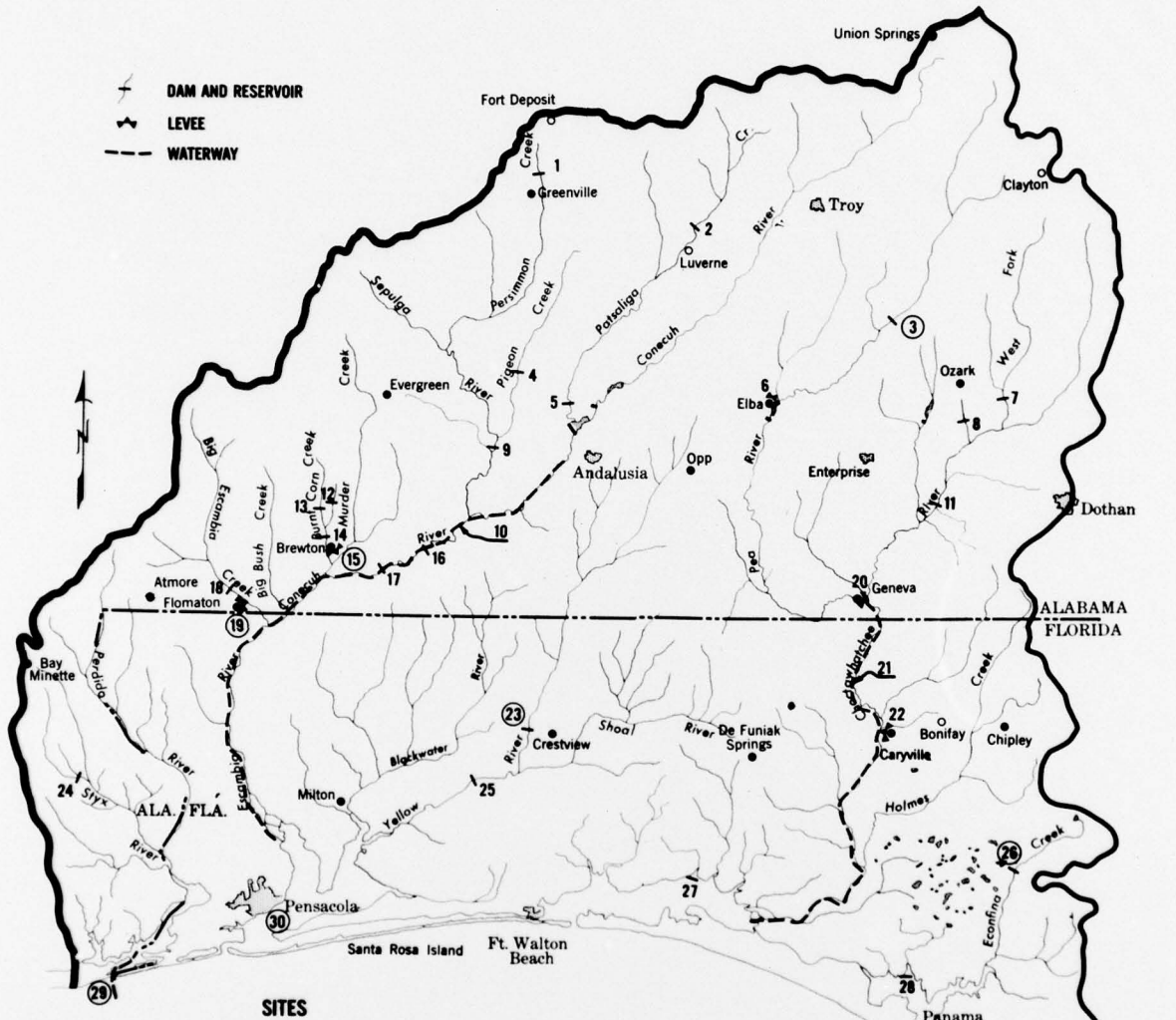
Name of project not included in plan	Key number on Fig. 4.9	Location	Description	Purpose*	Reason for not including in plan
Greenville	1	On Persimmon Creek E. of Greenville, Ala.	Dam and reservoir	WS	Not economically justified
Luverne	2	On Patsaliga Creek near Luverne, Ala.	Dam and reservoir	R, F&W	Not economically justified
Pigeon Creek	4	On Pigeon Creek near Andalusia, Ala.	Dam and reservoir	R, F&W	Not economically justified
Patsaliga Creek	5	On Patsaliga Creek 6 miles upstream from River Falls reservoir	Dam and reservoir	R, F&W	Not economically justified
Elba Levee	6	Adjacent to junction of Pea River and Beaverdam Creek at Elba, Ala.	Levee, in addition to existing levee	FC	Not economically justified
Newton	7	On W. Fork of Choctawhatchee River at mile 145 near Ozark, Ala.	Dam and reservoir	FC, R, F&W	Not economically justified
Ozark	8	On Hurricane Creek 3 miles S. of Ozark, Ala.	Dam and reservoir	R	Not economically justified
Sepulga River	9	On Sepulga River below confluence of Pigeon Creek	Dam and reservoir	FC	Questionable foundation conditions; extensive relocation problems
Navigation channel to Brewton and Andalusia, Ala.	10	From mouth of Escambia River to Brewton and Andalusia, Ala., on Conecuh River	Series of low-lift locks and dams	N	Not economically justified
Bellwood	11	On Choctawhatchee River at mile 113 at Bellwood, Ala.	Dam and reservoir	FC, R, F&W	Not economically justified
Lenox East	12	On Burnt Corn Creek, 1 mile E. of Lenox, Ala.	Dam and reservoir	FC, R	Not economically justified
Lenox West	13	On Brushy Creek, 1 mile W. of Lenox, Ala.	Dam and reservoir	FC, R	Not economically justified
Brewton	14	On Burnt Corn Creek, 2 miles N. of Brewton, Ala.	Dam and reservoir	FC, R, F&W	Not economically justified
Mile 110	16	On Conecuh River, 20 miles below Falls River. Ala.	Dam and reservoir	FC	Not economically justified
East Brewton	17	On Conecuh River, 7 miles E. of East Brewton, Ala.	Dam and reservoir	P	Not economically justified
Big Escambia	18	On Big Escambia Creek near Flomaton, Ala.	Dam and reservoir	FC, R, F&W	Not economically justified

(continued)

Name of project not included in plan	Key number on Fig. 4.9	Location	Description	Purpose*	Reason for not including in plan
Geneva Levee	20	On Choctawhatchee River in SW. section of Geneva, Ala., near State Highway No. 27	Levee, in addition to existing levee	FC	Not economically justified
Navigation project to Geneva, Ala.	21	From mouth of Choctawhatchee River to Geneva, Ala.	Series of low-lift locks and dams	N	Not economically justified
Caryville Levee	22	On E. bank of Choctawhatchee River at mile 64 at Caryville, Fla.	Ring levee	FC	Not economically justified
Styx River	24	On Styx River, 4 miles NE. of Rosinton, Ala.	Dam and reservoir	R, F&W	Proposed Crestview site better alternative
Wilkerson Bluff	25	On Yellow River at mile 30 below Crestview, Fla.	Dam and reservoir	WS	Not economically justified
Basin Bayou Embayment	27	At State Highway No. 20 bridge upstream from Choctawhatchee Bay, Fla.	Dam and reservoir	R, F&W	Access sites on Choctawhatchee Bay more economical alternative
Burnt Mill Embayment	28	On Burnt Mill Creek, 10 miles NW. of Panama City, Fla.	Dam and reservoir	R, F&W	Access sites on Choctawhatchee Bay more economical alternative

* FC —Flood control
WS —Water supplies
N —Navigation
P —Hydroelectric power
F&W—Fish and wildlife
R —Recreation

PROJECTS CONSIDERED



SITES

1 GREENVILLE
2 LUVERNE
(3) ARITON
4 PIGEON CREEK
5 PATSALIGA CREEK
6 ELBA LEVEE
7 NEWTON
8 OZARK
9 SEPULGA RIVER
10 NAVIGATION CHANNEL TO BREWTON & ANDALUSIA
11 BELLWOOD
12 LENOX EAST
13 LENOX WEST
14 BREWTON
(15) BREWTON LEVEE
16 MILE 110
17 EAST BREWTON
18 BIG ESCAMBIA
(19) FLOMATON LEVEE
20 GENEVA LEVEE
21 NAVIGATION CHANNEL TO GENEVA
22 CARYVILLE LEVEE
(23) CRESTVIEW
24 STYX RIVER
25 WILKERSON BLUFF
(26) ECONFINA CREEK
27 BASIN BAYOU EMBAYMENT
28 BURNT MILL EMBAYMENT
(29) PERDIDO PASS CHANNEL IMPROVEMENT
(30) PENSACOLA HARBOR AND PORT IMPROVEMENT
(31) PANAMA CITY HARBOR AND PORT IMPROVEMENT
(32) GULF COUNTY CANAL IMPROVEMENT
(33) PORT ST. JOE HARBOR & PORT IMPROVEMENT

◯ PROJECTS INCLUDED IN COMPREHENSIVE PLAN

Figure 4.9

PART FIVE – CONCLUSIONS

DISCUSSION

The future well-being of the people in the Choctawhatchee-Perdido basins is closely related to its location, climate, and abundant natural resources. These resources include an ample supply and good quality of surface and ground water; a good network of transportation facilities, including the Gulf Intracoastal Waterway with deep-water ports at Port St. Joe, Panama City, and Pensacola; and a coastline with many miles of outstanding beaches.

The naturally rich endowments and widely dispersed economic activities of the area give it the potential for continued growth of population, employment, and personal income through the year 2000. These are expected to be at growth rates greater than the national averages. The population of 692,500 is expected to increase to more than 1.5 million by 2000 and shift from about 50 percent urban to about 60 percent urban. Employment is expected to increase from 241,400 to 560,800. Per capita income is expected to rise from $1,541 annually in 1960 to $4,291 by 2000. The economic activities include manufacturing, tourist services, military operation, and agriculture and forestry.

The plan for the Choctawhatchee-Perdido basins presented in Part Four is a basis for meeting projected needs to the year 2000 for the efficient development of the basins land and water resources. It recognizes the rights and major responsibilities of the States and local interests in land and water resources development. It provides that the major portion of the new resource development programs and facilities be initiated, developed, and maintained by non-Federal entities. It is designed to provide a framework for meeting immediate needs for land and water, and at the same time maintain or establish a setting attractive to people considering the area as a place to live and to locate business enterprises.

To be effective, the plan must be implemented. This can be done as a combined local, State, and Federal effort by completion of the proposed programs and projects. In most instances, more detailed analyses and evaluations will be necessary before programs and projects are started. Because the plan is based on long-range assumptions and projections, it will need frequent reviews and periodic revisions to insure that it is properly responsive to the changing times and needs of the basins, the region, and the Nation.

With presently known management skills and technical knowledge, the land can produce food and fiber at several times the present rate and is more than adequate to meet the basins projected share of local and national requirements through the year 2000. Steps need to be taken to conserve for future generations the basic soil and water resources. The nonagricultural requirements for land will cause no serious restriction on agricultural production, and there is adequate land for the projected growth of urban areas with the accompanying industrial and service activities. Water, generally, is distributed favorably in relation to development possibilities, but surface water supplies are not always available to meet seasonal needs. If properly developed, sufficient water is available to meet all foreseeable requirements for human comfort and health and for needed expansion of industry, recreation, agriculture and forestry, and for fish and wildlife.

CONCLUSIONS

The Commission concludes that:

(1) Flooding in the basins occurs in the upstream areas and in several communities partially extended into the flood plains in Alabama and in Florida near the State line. Proposed levee construction, reservoirs and upstream watershed developments, will provide protection to the cities of Brewton and Flomation, Alabama; to other urban areas in Alabama and Florida; and to farmlands. Proper flood plain manage-

ment and zoning, particularly in areas along the main streams, will control further development in the overflow areas and reduce damages in the future.

(2) The program for domestic, municipal, and industrial water supplies will meet the basins needs to the year 2000. The availability of abundant good water will assist in the economic and industrial development in the area.

(3) The ground and surface waters of the basins are more than adequate to meet the foreseeable needs with proper development of the water resources.

(4) Improvement of the deep-water port terminal and harbor facilities of Port St. Joe, Panama City, and Pensacola will provide for projected traffic. Channel improvements will relieve needs for small craft at Perdido Pass and for barge traffic in the Gulf County Canal.

(5) Irrigation on an individual farm basis with sprinkler systems will serve an additional 10,000 acres of cropland.

(6) The upstream watershed projects will provide drainage and flood control and prevention on some of the bottom lands of watersheds totaling about 900,000 acres.

(7) Hydroelectric power facilities included in the Crestview project will provide some of the needed peaking capacity in the overall study area, but the power needs of the basins will continue to be supplied largely from thermal sources both within and outside the basins.

(8) Industrial development to fill the needed employment opportunities is essential. Implementation of the proposed plan will provide a favorable environment for this development.

(9) The lands of the Choctawhatchee-Perdido basins with presently known management and technology can produce food and fiber in excess of the basins share of the Nations needs to the year 2000.

(10) Annual and enduring soil conservation and utilization measures are necessary to conserve the basic land resource and to improve the per capita income and standard of living of the farmer. The plan provides for treatment of an additional 941,000 acres of cropland, pastureland, and rangeland by 2000, installation of an additional 6,900 farm ponds, and conversion of many acres to more compatible land use.

(11) Acceleration of the forestry programs proposed in the plan will meet projected timber production needs for 2000 of two and one-half times the timber production in 1960.

(12) Present facilities in the basins for fishing and hunting are not adequate generally to meet the demands. The projects and programs included in the plan will meet the demands of 2000 with some possible adjustment in sportsman's choice as to types of hunting. The proposed impoundment and fishing lake projects will provide facilities to fill a part of the deficit demand for fishing. The commercial production of seafoods is expected to double by the year 2000 with the proposed physical and technological improvements.

(13) Outdoor recreation is a major resource of the basins, especially along the beaches of the Gulf, bays, and inlets. The projects and programs proposed in the plan for existing and new areas, coastal and inland, will provide for the needs to 2000.

(14) Salinity and sediment are not major problems in the Choctawhatchee-Perdido basins from a land-use standpoint. However, salt water intrusion in the ground water aquifer along the coast is a problem at Pensacola and other developed areas and will require judicious withdrawal of water and further study.

(15) Pollution in the basins from municipal and industrial wastes is a major problem. New and extended sewerage systems and new and enlarged municipal and industrial waste treatment facilities are needed in many localities. Facilities proposed in the plan with known technology and treatment methods will alleviate the problem.

(16) The pollution abatement and public health program will contribute to the general health and welfare of the basins residents, tourists, and recreationists.

(17) Beach erosion and hurricane damage potentials are sufficiently serious to warrant further study.

(18) The non-Federal costs of plan implementation, operation, maintenance, and replacements are within the financial capabilities of the basins, but some outside assistance in financing may be required. The proposed Deadening Lakes development is located in an economically

distressed area and it would demonstrate the effects of a water development project on the economy and the ability of such a development to repay a proper portion of its costs.

(19) As water uses increase, there will be more competition for the available supplies. Optimum water development sometimes will require the storage of surplus flows for use at points considerable distances from the site in which the flows are stored. Some agreement among the interested groups – local, State, and Federal – will be needed to insure that the distribution of stored water will conform to the planned uses.

(20) Basic data available for the Choctawhatchee-Perdido basins for resources planning are meager. Additional topographic and geologic mapping, hydrologic and economic data, and analyses of existing information are necessary for implementation of the plan.

(21) The projects and programs described in Part Four provide a basic, comprehensive, and integrated plan of development of the land and water resources of the basins. Their development, with the adjustments and revisions growing out of more detailed studies, should assist greatly in obtaining maximum public benefits for the region and the Nation, consistent with the objectives and criteria of the study.

PART SIX – LOCAL, STATE, AND FEDERAL PARTICIPATION AND ASSISTANCE

Acknowledgements

The U. S. Study Commission, Southeast River Basins, gratefully acknowledges the assistance and cooperation of the following:

Alabama

Department of Agriculture; Auburn University; Department of Conservation; State Docks Department; Extension Service; Division of Forestry; Geological Survey; Department of Public Health; Highway Department; State Planning and Industrial Development Board; Department of Labor; Pilotage Commission; Public Service Commission; River Development Board; Soil Conservation Committee; Soil Conservation Districts; and Water Improvement Commission.

Florida

Department of Agriculture; Board of Conservation; Development Commission; Extension Service; Florida State University; University of Florida; Forest Service; Game and Fresh Water Fish Commission; State Board of Health; Industrial Commission; Inland Navigation District; Board of State Parks and Historical Monuments; Railroad and Public Utilities Commission; Road Department; Soil Conservation Board; Soil Conservation Districts; and Suwannee River Water Conservation Authority.

Georgia

Department of Agriculture; Bainbridge Port Authority; Brunswick Port Authority; Extension Service; Forestry Commission; Game and Fish Commission; University of Georgia; Georgia Institute of Technology; Georgia State College; Georgia Southern College; Department of Public Health; Highway Department; Department of Industry and Trade; Jekyll Island State Park Authority; Department of Labor; Department of Mines, Mining, and Geology; Department of State Parks; Georgia Ports Authority; Public Service Commission; Savannah District Authority; Soil and Water Conservation Committee; Soil and Water Conservation Districts; Tidewater Commission; Waterways Commission; Water Quality Council; and Water Resources Commission.

North Carolina

Extension Service; State Board of Conservation and Development; Highway Department; North Carolina State College; Western North Carolina Regional Planning Commission; Soil Conservation Committee; Department of Water Resources; Soil Conservation Districts; and Wildlife Resources Commission.

South Carolina

Department of Agriculture; Clemson College; Development Board; Extension Service; Forestry Commission; State Board of Health; Department of Labor; Congaree Navigational Study Committee; Parks Commission; Ports Authority; Public Service Authority; Public Service Commission; Soil Conservation Committee; Committee for Water Development; Soil Conservation Districts; Water Pollution Control Authority; and Wildlife Resources Department.

General

Altamaha Development Association; Middle Chattahoochee Development Association; Upper Chattahoochee Development Association; Choctawhatchee-Pea Development Association; Council of State Governments; Southern Regional Education Board; Southeastern Power Committee of Electric Membership Cooperatives of Nine Southeastern States; and Three Rivers Development Association.

Federal

U. S. Department of Agriculture—Agricultural Marketing Service, Agricultural Research Service, Agricultural Stabilization and Conservation Service, Economic Research Service, Farmers Home Administration, Forest Service, and Soil Conservation Service; U. S. Department of the Army—Beach Erosion Board, Board of Engineers for Rivers and Harbors, Corps of Engineers, and Military Posts; Atomic Energy Commission; Atlanta Federal Reserve Bank; U. S. Civil Service Commission; U. S. Department of Commerce—Area Redevelopment Administration,

Business and Defense Services Administration, Bureau of the Census, Office of Business Economics, Bureau of Public Roads, Small Business Administration, and Weather Bureau; Federal Power Commission; General Services Administration; U. S. Department of Health, Education, and Welfare—Public Health Service; Housing and Home Finance Agency; U. S. Department of the Interior—Bureau of Commercial Fisheries, Geological Survey, Bureau of Mines, National Park Service, Bureau of Reclamation, Bureau of Outdoor Recreation, Southeastern Power Administration, and Bureau of Sport Fisheries and Wildlife; U. S. Department of Labor—Bureau of Labor Statistics; U. S. Department of the Navy—Sixth Marine Corps Reserve and Recruitment District; Executive Office of the President—Bureau of the Budget, and Public Works Planning; Outdoor Recreation Resources Review Commission; Advisory Commission on Intergovernmental Relations; Select Committee on National Water Resources, U. S. Senate, 86th Congress; Smithsonian Institution; U. S. Study Commission—Texas; and Tennessee Valley Authority.

In addition, the Commission gratefully acknowledges assistance received from numerous county and municipal governments, planning commissions, development commissions, chambers of commerce, corporations, trade associations, interested individuals, press, radio, television, and professional societies.

Public Hearings and Presentations

A series of public hearings were held early in the investigation to secure the views and desires of various interests, organizations, and individuals. These hearings were held at Tallahassee, Florida, on November 16, 1959; at Dothan, Alabama, on November 17, 1959; at Macon, Georgia, on November 18, 1959; and at Anderson, South Carolina, on November 19, 1959.

During the latter stage of the studies, a series of public presentations were held to acquaint the public with the proposed plan of the Commission for development of the land and water resources of the Southeast River Basins; to inform Federal, State, local, and private interests of their responsibility in implementing the developments proposed; and to solicit views and opinions on the proposals under active consideration. These presentations were held as follows:

Place	Date
Statesboro, Georgia	March 20, 1962
Waycross, Georgia	March 23, 1962
Tallahassee, Florida	May 15, 1962
White Springs, Florida	May 17, 1962
Valdosta, Georgia	May 18, 1962
Geneva, Alabama	June 19, 1962
Pensacola, Florida	June 20, 1962
Savannah, Georgia	July 16, 1962
Clemson, South Carolina	July 17, 1962
Atlanta, Georgia	August 13, 1962
Columbus, Georgia	August 14, 1962
Albany, Georgia	August 14, 1962
Baxley, Georgia	August 15, 1962
Macon, Georgia	August 16, 1962
Athens, Georgia	August 17, 1962

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2.16	U. S. Soil Conservation Service
2.17	Florida Forest Service
2.19	Florida Forest Service
2.20	U. S. Soil Conservation Service
2.22	Alabama Department of Conservation
2.23	Alabama Department of Conservation
2.26	Florida State News Bureau
2.27	U. S. Soil Conservation Service
2.28	U. S. Soil Conservation Service
2.30	U. S. Soil Conservation Service
2.31	U. S. Soil Conservation Service
2.32	U. S. Soil Conservation Service
All other	U. S. Study Commission Staff